A90-0132

Modular Multi System

Service Manual

Air Conditioner – Multi Split Type System

HFC R407C

TOSHIBA
AIR CONDITIONING

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Precautions

⚠ Read these Safety Notes carefully before installing this unit.

⚠ These Safety Notes contain very important safety information. Always be sure to observe these cautions.

⚠ After installation is complete, trial the operation of the unit to make sure that it is operating normally. Instruct the customer about how to operate the unit, and about necessary maintenance.

⚠ **The dealer or a special contractor must install this unit.**
Attempts to install this unit by a customer could result in leaks, electric shock, or fire. Improper installation could result in leaks, electric shock, or fire.

⚠ **If this unit is installed in a small room, measures must be taken to ensure that, even in the event of a refrigerant leak, the maximum safe limit for refrigerant concentration levels in the air is not exceeded.**
Consult the dealer for details on what measures can be taken to keep from exceeding the maximum safe limit. If a refrigerant leak does cause refrigerant concentration levels in the air to exceed the maximum safe limit, asphyxiation could result.

⚠ **Select a location for installation that will be able to safely bear the weight of the unit.**
If the installation location is not strong enough to support the unit and the unit falls, injury could result.

⚠ **Install the unit in the prescribed manner to withstand strong (hurricane-level) winds and earthquakes.**
Insufficiently secure installation could allow the unit to tip over, fall, or otherwise cause an accident.

⚠ **Ventilate the area if any refrigerant leaks during installation.**
If the refrigerant comes into contact with an open flame, it will produce a toxic gas.

⚠ **After completing installation, make sure that no refrigerant is leaking.**
If the refrigerant leaks indoors and comes into contact with an open flame in a water heater, stove, oven, or other such appliance, it will produce a toxic gas.

⚠ **Electrical work must be performed by a qualified electrician as described in the Installation Manual.**
The unit must be connected to its own independent circuit. Inadequate circuit capacity or improper installation could result in electric shock or fire.

⚠ **Wiring must be performed securely, using the prescribed cables.**
The cables must be secured in a manner that prevents any force that pulls on the cables from being relayed to the terminal connectors. If the cables are not connected or secured properly, fire or other accidents could result.

⚠ **The unit must be grounded.**
Do not connect the ground wire to a gas pipe, water pipe, lightning rod, or telephone ground wire. When wiring the system to the main power source, follow the standards established by the local power company. Inadequate grounding can result in electric shock.

⚠ **Do not install the unit in a location where combustible gases could conceivably leak.**
Leaking gases that accumulate in the vicinity of the unit could be ignited by the unit.

Components

1. Outdoor Unit

Corresponding HP	Inverter unit		Fixed-speed unit			Appearance
	8HP	10HP	6HP	8HP	10HP	
Model name	MM-A0224HT	MM-A0280HT	MM-A0160HX	MM-A0224HX	MM-A0280HX	
Cooling capacity (kW)	22.4	28.0	16.0	22.4	28.0	
Heating capacity (kW)	25.0	31.5	18.0	25.0	31.5	

2. Outdoor Units (Combination of Outdoor Units)

Corresponding HP		8HP	10HP	14HP	16HP	18HP	20HP	22HP	24HP	26HP	28HP	30HP	32HP	34HP	36HP	38HP	40HP	42HP	44HP	46HP
Combined Model MM-A~HT		0224	0280	0384	0440	0504	0560	0608	0672	0728	0784	0840	0896	0952	1008	1064	1120	1176	1232	1288
Cooling capacity (kW)		22.4	28.0	38.4	44.8	50.4	56.0	60.8	67.2	72.8	78.4	84.0	89.6	95.2	100.8	106.4	112.0	117.6	123.2	128.8
Combined outdoor units	Inverter unit	8HP	10HP	8HP	8HP	10HP	10HP	8HP	8HP	10HP	10HP	10HP	8HP	10HP	10HP	10HP	10HP	10HP	10HP	10HP
	Fixed-speed unit	—	—	6HP	8HP	8HP	10HP	8HP	8HP	8HP	10HP	10HP	8HP	8HP	10HP	10HP	10HP	8HP	10HP	10HP
		—	—	—	—	—	—	6HP	8HP	8HP	8HP	10HP	8HP	8HP	8HP	10HP	10HP	8HP	8HP	10HP
		—	—	—	—	—	—	—	—	—	—	—	8HP	8HP	8HP	8HP	10HP	8HP	8HP	8HP
		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8HP	8HP	8HP
No. of connectable indoor units		13	16	16	18	18	20	22	24	26	28	30	32	34	36	38	40	40	40	40
Min. HP Connected		4	5	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Max. HP Connected		10.8	13.5	18.9	21.6	24.3	27	29.7	32.4	35.1	37.8	40.5	43.2	45.9	48.6	51.3	54	56.7	59.4	62.1

3. Branching joints/headers

	Model name	Usage		Appearance
Y-shape branching joint	RBM-Y018	Indoor unit capacity code (*1): Total below 6.4		
	RBM-Y037	Indoor unit capacity code (*1): Total 6.4 or more and below 13.2	(*2)	
	RBM-Y071	Indoor unit capacity code (*1): Total 13.2 or more and below 25.2	(*2)	
	RBM-Y129	Indoor unit capacity code (*1): Total 25.2 or more	(*2)	
4-branching header (*3)	RBM-H4037	Indoor unit capacity code (*1): Total below 13.2	Max. 4 branches	
	RBM-H4071	Indoor unit capacity code (*1): Total 13.2 or more and below 25.2		
8-branching header (*3)	RBM-H8037	Indoor unit capacity code (*1): Total below 13.2	Max. 8 branches	
	RBM-H8071	Indoor unit capacity code (*1): Total 13.2 or more and below 25.2		
T-shape branching joint (For connection of outdoor unit)	RBM-T129	1 set of 3 types of T-shape joint pipes as described below: The required quantity is arranged and they are combined at the site.		

Connecting pipe	Corresponding dia. (mm).	Qty
Balancing pipe	Ø9.52	1
Piping at liquid side	Ø12.7 to Ø22.2	1
Piping at gas side	Ø22.2 to Ø54.1	1

(*1). Code is determined according to the capacity code of the Indoor units connected.
(*2). If the total capacity code value of Indoor units exceeds that of Outdoor units, apply the capacity code of Outdoor units.
(*3). When using a branch header, Indoor units with a maximum of 6.0 capacity code in total can be connected to each branch.

NOTE: If the length of the gas pipe exceeds 30m from the 1st branching to an Indoor unit, increase the gas pipe size by 1 size, i.e. MM-U140 = Gas Ø22.2, Liquid Ø9.5

Summary

Operating Conditions

- The units referred to within this manual conform with the protection requirements of Directives 89/336/EEC Electromagnetic Compatibility and 73/23/EEC Low voltage.
- Operating conditions of the unit are as follows:

Outdoor temperature	-5 ~ 43°C	Cooling
	-15 ~ 21°C	Heating
Room Temperature	18 ~ 32°C	Cooling
	15 ~ 29°C	Heating
Room humidity	<80%	Cooling

Note 1: Cooling capacity is rated at the following temperature conditions:
Indoor air inlet temperature 27°C DB, 19°C WB.
Outdoor air inlet temperature 35°C DB.

Note 2: Heating capacity is rated at the following temperature conditions:
Indoor air inlet temperature 20°C DB.
Outdoor air inlet temperature 7°C DB, 6°C WB.

Note 3: For details about the Outdoor unit, Indoor units or Remote Controller installation refer to the relevant literature, i.e. Installation Instructions supplied with the units.

Note 4: Operatives handling refrigerants must be suitably qualified in accordance with local and national codes of practice and statutory requirements.

Note 5: Legislation may regulate the removal of waste refrigerant from the systems. We advise awareness of any regulations and duty of care. Waste refrigerant must NEVER be discharged to atmosphere.

Note 6: Electrical work should be in accordance with all relevant codes of practice and should be carried out by suitably qualified personnel.

Note 7: Metric/Imperial pipe conversion.

Diameter (mm)	6.4	9.5	12.7	15.9	19.0	22.0	28.6	34.9	41.3	54.1
Nominal diameter (inch)	1/4	3/8	1/2	5/8	3/4	7/8	1 1/8	1 3/8	1 5/8	2 1/8

Note 8: Within this manual:

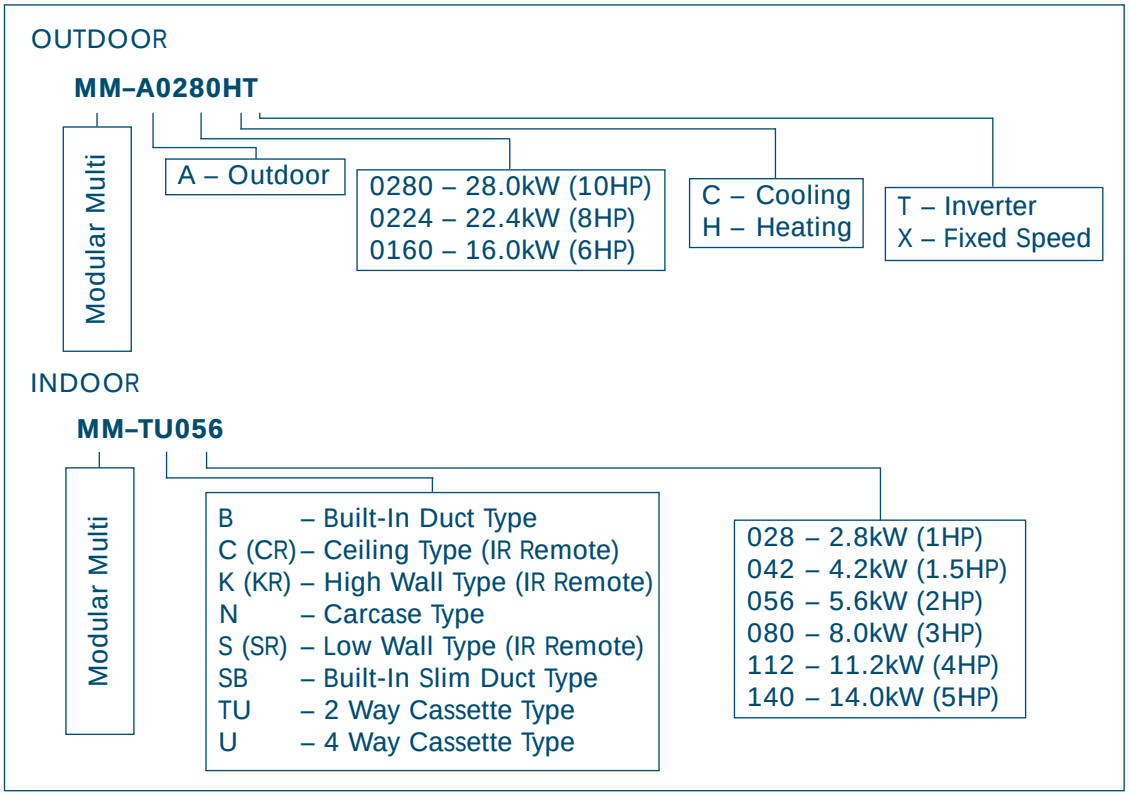
ODU	=	Outdoor Unit	IDU	=	Indoor Unit
R/C	=	Remote Controller	D.O.L.	=	Direct On-Line compressor
INV	=	HP Inverter ODU	FIX	=	HP Fixed Speed ODU
DB	=	Dry Bulb	WB	=	Wet Bulb
Mg-Sw	=	Magnetic Contactor	IOL	=	Inner Overload Relay
OCR	=	Over Current Relay	IGBT	=	Inverter Gate Bi-Polar Transistor

Note 9: MPaG ⇒ kgf/cm^{2}G Conversion multiplier
1.0MPaG = 10.2kgf/cm^{2}G

Summary

Operating Conditions

1. Model name



2. Range of combined units

No. of combined units : 1 to 5 units
Capacity range : Equivalent to 38.4kW type (14HP) to 128.8kW (46HP)

3. Restriction for combination units

(1) The Inverter Unit should have the maximum capacity among all units in that combination.
(2) The 16.0kW (6HP) fixed-speed unit is available only with the combination of 38.4kW (14HP) and 60.8kW (22HP). (It cannot be used for any other combination.)

4. Mode priority

This Outdoor Unit is set to operate with the Heating mode taking precidence. This precidence can be switched between Heat and Cool mode using the DIP switch 07 on the Outdoor Unit Interface PCB (MCC-1343-01) as follows:

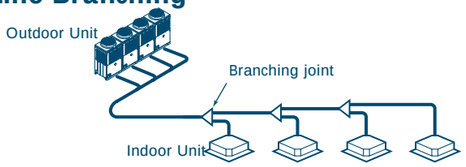
Heat Priority (factory set)

Cool Priority

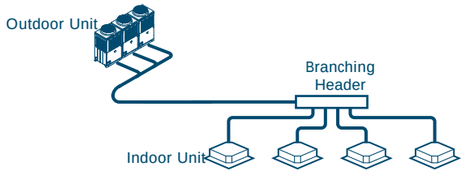
● Branching

Combination of line and header branching is highly flexible. This allows for the shortest design route possible, thereby saving on installation time and cost. Line/header branching after header branching is only available with Toshiba's Multi Modular System.

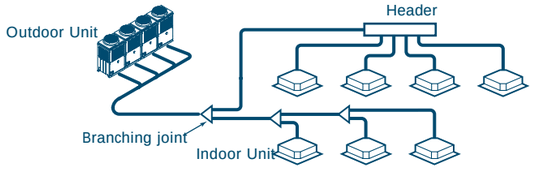
Line Branching



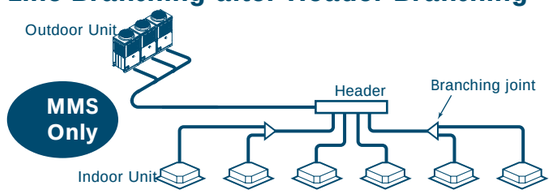
Header Branching

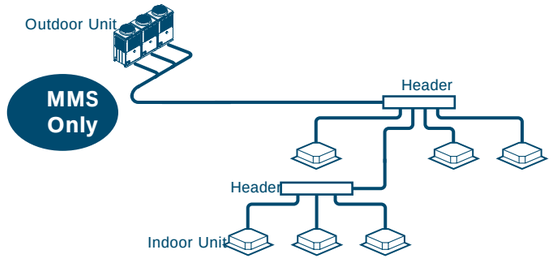


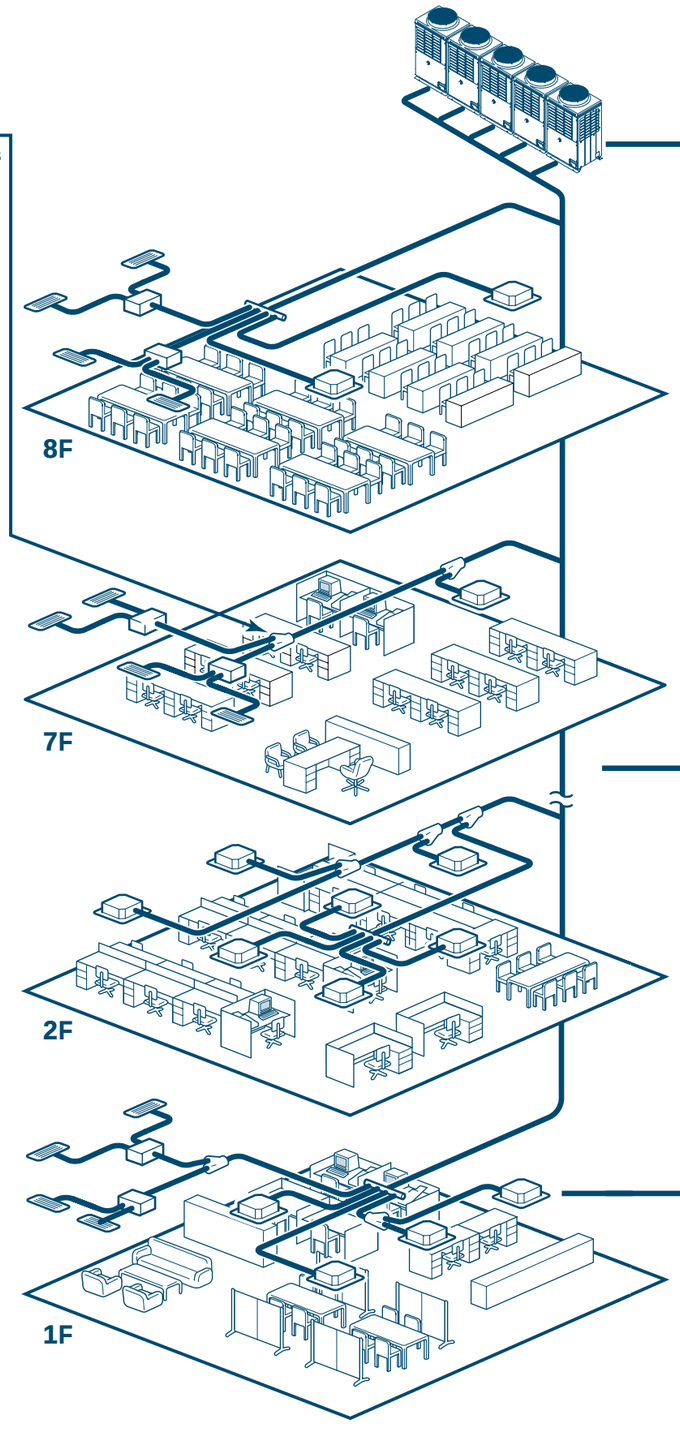
Line + Header Branching



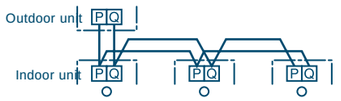
Line Branching after Header Branching







• Non-polarized control wiring between outdoor and indoor units

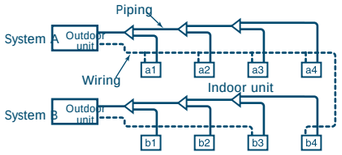


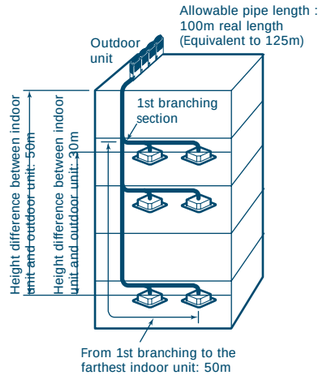
• Wiring diagnosis system

[Example of wiring diagnosis]

Use the switches on the microcomputer PCB of the outdoor unit.

- Detects wiring to the indoor unit b4 which should not be in system A.
- b4 is missing in system B.




Allowable pipe length : 100m real length (Equivalent to 125m)
Outdoor unit
1st branching section
Height difference between indoor unit and outdoor unit: 50m
Height difference between indoor unit and outdoor unit: 30m
From 1st branching to the farthest indoor unit: 50m

TOSHIBA

Outline of MMS (Modular Multi System)

3

● Compact design

The design of the Toshiba MMS outdoor unit allows for easy unit maneuvering into any standard lift. Its size also allows it to be easily installed in limited spaces.

● Largest system capacity

Toshiba's Multi Modular System can be combined up to 128.8kW (46 HP).

● Advanced bus communication system

Wiring between indoor and outdoor unit is a simple 2-wire system.
Communication address is also automatically configured.
A default test mode operation is available.

● Self diagnostic system

Comprehensive troubleshooting code enables quick identification of problems arising.

● High lift design

Real pipe length of 100m (equivalent length 125m) and vertical lift of 50m is made possible with Toshiba's Multi Modular System.
Vertical lift between indoor units of 30m is the highest in the market.
This allows for greater flexibility in the location of the system.

● Multiple indoor units

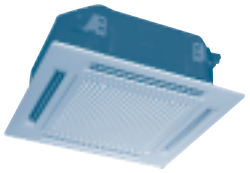
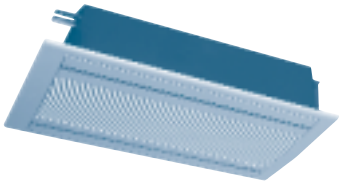
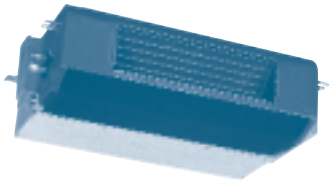
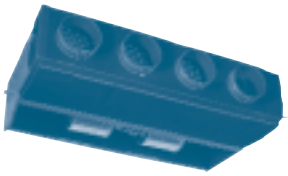
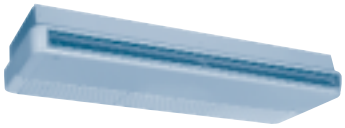
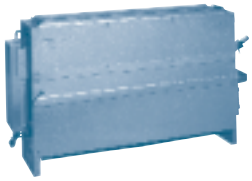
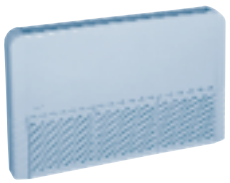
Indoor units with different capacities and configurations can be combined up to 135% of the outdoor unit capacity.
A maximum of 40 indoor units can be combined with the 46 HP outdoor module.

● Intelligent control

Toshiba's MMS intelligent controls and modulating valves deliver the required capacity, according to the load variation from 50% to 100%. The intelligent controls and modulating valves limit or increase the cooling/heating capacity dynamically so humidity and temperature are kept in the comfort zone.

Parts Specifications

Indoor Units

Type	Appearance	Model name	Capacity code	Cooling Capacity (kW)	Heating Capacity (kW)
4 Way Cassette Type 'U'		MM-U056 MM-U080 MM-U112 MM-U140	2 3 4 5	5.6 8.0 11.2 14.0	6.4 9.6 12.8 15.8
2 Way Cassette Type 'TU'		MM-TU028 MM-TU042 MM-TU056	1 1.5 2	2.8 4.2 5.6	3.2 4.8 6.4
Built-In Slim Duct Type 'SB'		MM-SB028	1	2.8	3.2
Built-In Duct, Type 'B'		MM-B056 MM-B080 MM-B112 MM-B140	2 3 4 5	5.6 8.0 11.2 14.0	6.4 9.6 12.8 15.8
Ceiling Type 'C'		MM-C/CR042 MM-C/CR056 MM-C/CR080 MM-C/CR112 MM-C/CR140	1.5 2 3 4 5	4.2 5.6 8.0 11.2 14.0	4.8 6.4 9.6 12.8 15.8
High Wall Type 'K'		MM-K/KR042 MM-K/KR056 MM-K/KR080	1.5 2 3	4.2 5.6 8.0	4.8 6.4 9.6
Carcase Type 'N'		MM-N028 MM-N042 MM-N056 MM-N080	1 1.5 2 3	2.8 4.2 5.6 8.0	3.2 4.8 6.4 9.6
Low Wall Type 'S'		MM-S/SR056 MM-S/SR080	2 3	5.6 8.0	6.4 9.6

Parts Specifications

Outdoor Units

COMPRESSOR	MODEL				
	MM-A0280HT	MM-A0224HT	MM-A0280HX	MM-A0224HX	MM-A0160HX
Model Name	MG1450CW-21B		YG1800CW-B1	YG1700CW-B1	YG890C-B1
Motor Type	3 – Phase induction motor				
Power Supply	380 – 415V, 3 – Phase, 50Hz				
Output (kW)	7.5	7.5	7.5	7.5	4.1
Pole (P)	2/2 (INV/Fixed)		2/2 (Fixed/Fixed)		2
Coil Resistance (Ω)	1.18/2.25 (INV/Fixed)		2.25/2.25 (Fixed/Fixed)		2.250
Comp. Oil Name	NISSEKI RB68AF VG 74				
Amount of Oil (ml)	7500	7500	7500	7500	2000
Inner Over-load Relay	Opens: 115±5 °C Closes: 93±10°C				

4-WAY VALVE	MODEL				
	MM-A0280HT	MM-A0224HT	MM-A0280HX	MM-A0224HX	MM-A0160HX
Model Name	CHV-0712	CHV-0712	CHV-0712	CHV-0712	CHV-0401
Coil Specification	AC240V	AC240V	AC240V	AC240V	AC240V

MM-A0280HT, MM-A0224HT, MM-A0280HX, MM-A0224HX, MM-A0160HX

PARTS NAME		SPECIFICATION
Fan Motor	Model Name	STF-200-350A
	Motor Type	1-Phase induction motor
	Power Supply	AC 220-240V, 1 Phase, 50Hz
	Output (W)	400
	Current (A)	4.81~5.89
	Pole (P)	6
High Pressure Switch	Model Name	INV=ACB-JB128 FIX=ACB-JA64
	Operating Pressure (kgf/cm²G)	Operation: 3.2, Reset 2.55
High Pressure Sensor	Model Name	150NH4-H
	Operating Conditions	0~3.33MPa
Low Pressure Sensor	Model Name	150NH4-L
	Operating Conditions	0~0.98MPa
Compressor Case Heater (fixed speed only)		AC240V, 74W
Accumulator Case Heater		AC240V, 29W
Discharge Temperature Sensor		At 50°C=18.1KΩ, At 100°C=3.35KΩ
Suction Temperature Sensor		At 0°C=34.6KΩ, At 25°C=10.0KΩ, At 50°C=3.4KΩ
Pulse Modulating Valve		L12A-03, DC12V
Pulse Modulating Valve (For Cooling Bypass)		A12A-15, DC12V
2-way Valve		NEV-603DXF, Coil 240V
2-way Valve		NEV-202DXF, Coil 240V

Parts Specifications

Indoor Units

Built-In Duct: MM-B140

No.	PARTS NAME	TYPE	SPECFICATIONS
1	Fan Motor	STF-200-140-4F	Output (rated) 140W, 4 pole, 200V, 1 Phase 50Hz
2	Running Capacitor – fan motor	EAG40M106UF	AC 400V 10μF
3	Pulse Motor Valve	EDM-B60YPTF-7B-A	Capacity: 60

Built-In Duct: MM-B112

No.	PARTS NAME	TYPE	SPECFICATIONS
1	Fan Motor	STF-200-120-4B	Output (rated) 120W, 4 pole, 200V, 1 Phase 50Hz
2	Running Capacitor – fan motor	EAG40M505UF	AC 400V 5μF
3	Pulse Motor Valve	EDM-B40YPTR-7B-A	Capacity: 40

Built-In Duct: MM-B080

No.	PARTS NAME	TYPE	SPECFICATIONS
1	Fan Motor	STF-200-100-4B	Output (rated) 100W, 4 pole, 200V, 1 Phase 50Hz
2	Running Capacitor – fan motor	EAG40M505UF	AC 400V 5μF
3	Pulse Motor Valve	EDM-B40YPTR-7B-A	Capacity: 40

Built-In Duct: MM-B056

No.	PARTS NAME	TYPE	SPECFICATIONS
1	Fan Motor	STF-230-60-4A	Output (rated) 60W, 4 pole, 230V, 1 Phase 50Hz
2	Running Capacitor – fan motor	EEP2G405HQA114	AC 400V 4μF
3	Pulse Motor Valve	EDM-B40YPTR-7B-A	Capacity: 40

Built-In Duct: MM-B140, MM-B112, MM-B080, MM-B056

No.	PARTS NAME	TYPE	SPECFICATIONS					
4	Transformer	TT-03-1	DC 16.3V 0.5A/AC 11.6V 0.15A					
5	Pulse Motor	EDM-MD12TF-3	DC12V					
6	Pressure Sensor	150/100NH6-D	Power Voltage DC 12V					
7	Sensor for room temperature	TA	Maximum input	°C	25		50	
			38mA (at 25°C)	kΩ	10		3.45	
8	Sensor for heat exchanger	Tc1	Maximum input	°C	-12	0	25	50
			34mA (at 25°C)	kΩ	62.3	32.8	10	3.6
9	Sensor for heat exchanger	Tc2	Maximum input	°C	0	25	50	
			26mA (at 25°C)	kΩ	34.6	10	3.4	
10	Control PCB	CM**C02	AC 220-240V					
11	Power PCB	P**RC01	AC 220-240V					

Built-In Slim Duct: MM-SB028

No.	PARTS NAME	TYPE	SPECFICATIONS					
1	Fan Motor	SMF-230-34-4J	Output (rated) 34W, 4 pole, 230V, 1 Phase 50Hz					
2	Running Capacitor – fan motor	EEP2H105HQA105	AC 500V 1.0μF					
3	Pulse Motor Valve	EDM-B25YPTF-7B-A	Capacity: 25					
4	Transformer	TT-03-1	DC 16.3V 0.5A/AC 11.6V 0.15A					
5	Pulse Motor	EDM-MD12TF-3	DC12V					
6	Pressure Sensor	150/100NH6-D	Power Voltage DC 12V					
7	Sensor for room temperature	TA	Maximum input	°C	25		50	
			38mA (at 25°C)	kΩ	10		3.45	
8	Sensor for heat exchanger	Tc1	Maximum input	°C	-12	0	25	50
			34mA (at 25°C)	kΩ	62.3	32.8	10	3.6
9	Sensor for heat exchanger	Tc2	Maximum input	°C	0	25	50	
			26mA (at 25°C)	kΩ	34.6	10	3.4	
10	Control PCB	CM**C02	AC 220-240V					
11	Power PCB	P**RC01	AC 220-240V					

Parts Specifications

Indoor Units

High Wall: MM-K080, MM-KR080

No.	PARTS NAME	TYPE	SPECFICATIONS
1	Fan Motor	MMF-230-27-4R	Output (rated) 27W, 4 pole, 230V, 1 Phase 50Hz
2	Running Capacitor – fan motor	EEP2W205HQA107	AC 450V 2.0μF
3	Pulse Motor Valve	EDM-B40YPTR-7B-A	Capacity : 40

High Wall: MM-K056, MM-KR056

No.	PARTS NAME	TYPE	SPECFICATIONS
1	Fan Motor	MMF-230-27-4P	Output (rated) 27W, 4 pole, 230V, 1 Phase 50Hz
2	Running Capacitor – fan motor	EEP2H155HQA107	AC 500V, 1.5μF
3	Pulse Motor Valve	EDM-B40YPTR-7B-A	Capacity : 40

High Wall: MM-K042, MM-KR042

No.	PARTS NAME	TYPE	SPECFICATIONS
1	Fan Motor	MMF-230-27-4P	Output (rated) 27W, 4 pole, 230V, 1 Phase 50Hz
2	Running Capacitor – fan motor	EEP2H105HQA105	AC 500V, 1.0μF
3	Pulse Motor Valve	EDM-B25YPTF-7B-A	Capacity : 25

High Wall: MM-K080, MM-KR080 MM-K056, MM-KR056

No.	PARTS NAME	TYPE	SPECFICATIONS					
4	Transformer	TT - 03 - 1	DC 16.3V 0.5A / AC 11.6V 0.15A					
5	Pulse Motor	EDM-MD12TF-3	DC12V					
6	Pressure Sensor	150/100NH6-D	Power Voltage DC 12V					
7	Sensor for room temperature	TA	Maximum input	°C	25		50	
			38mA (at 25°C)	kΩ	10		3.45	
8	Sensor for heat exchanger	Tc1	Maximum input	°C	-12	0	25	50
			34mA (at 25°C)	kΩ	62.3	32.8	10	3.6
9	Sensor for heat exchanger	Tc2	Maximum input	°C	0	25	50	
			26mA (at 25°C)	kΩ	34.6	10	3.4	
10	Control PCB	CM**C03	AC 220-240V					
11	Power PCB	P**RC01	AC 220-240V					

Parts Specifications

Indoor Units

2-Way Cassette: MM-TU056

No.	PARTS NAME	TYPE	SPECFICATIONS
1	Fan Motor (x2)	PAF-230-7-4	Output (rated) 7W, 4 pole, 230V, 1 Phase 50Hz
2	Running Capacitor – fan motor (x2)	EEP2H105HQA105	AC 500V, 1.0μF
3	Pulse Motor Valve	EDM-B40YPTR-7B-A	Capacity : 40

2-Way Cassette: MM-TU042

No.	PARTS NAME	TYPE	SPECFICATIONS
1	Fan Motor (x2)	PAF-230-7-4	Output (rated) 7W, 4 pole, 230V, 1 Phase 50Hz
2	Running Capacitor – fan motor (x2)	EEP2H105HQA105	AC 500V, 1.0μF
3	Pulse Motor Valve	EDM-B40YPTR-7B-A	Capacity : 25

2-Way Cassette: MM-TU028

No.	PARTS NAME	TYPE	SPECFICATIONS
1	Fan Motor (x2)	PAF-230-7-4	Output (rated) 7W, 4 pole, 230V, 1 Phase 50Hz
2	Running Capacitor – fan motor (x2)	EVM45M504UF	AC 450V, 0.5μF
3	Pulse Motor Valve	EDM-B25YPTF-7B-A	Capacity : 25

2-Way Cassette: MM-TU056, MM-TU042, MM-TU028

No.	PARTS NAME	TYPE	SPECFICATIONS					
4	Transformer	TT - 03 - 1	DC 16.3V 0.5A / AC 11.6V 0.15A					
5	Pulse Motor	EDM-MD12TF-3	DC12V					
6	Pressure Sensor	150/100NH6-D	Power Voltage DC 12V					
7	Sensor for room temperature	TA	Maximum input	°C	25		50	
			38mA (at 25°C)	kΩ	10		3.45	
8	Sensor for heat exchanger	Tc1	Maximum input	°C	-12	0	25	50
			34mA (at 25°C)	kΩ	62.3	32.8	10	3.6
9	Sensor for heat exchanger	Tc2	Maximum input	°C	0	25	50	
			26mA (at 25°C)	kΩ	34.6	10	3.4	
10	Control PCB	CM**C01	AC 220-240V					
11	Power PCB	P**RC01	AC 220-240V					

Parts Specifications

Indoor Units

4-Way Cassette: MM-U140

No.	PARTS NAME	TYPE	SPECFICATIONS
1	Fan Motor	MMF-230-36A	Output (rated) 36W, 6 pole, 230V, 1 Phase 50Hz
2	Running Capacitor – fan motor	EVM45M305UF	AC 450V, 3.0μF
3	Pulse Motor Valve	EDM-B60YPTF-7B-A	Capacity: 60

4-Way Cassette: MM-U112

No.	PARTS NAME	TYPE	SPECFICATIONS
1	Fan Motor	MMF-230-36A	Output (rated) 36W, 6 pole, 230V, 1 Phase 50Hz
2	Running Capacitor – fan motor	EEP2W255HQA113	AC 450V 2.5μF
3	Pulse Motor Valve	EDM-B40YPTR-7B-A	Capacity: 40

4-Way Cassette: MM-U080

No.	PARTS NAME	TYPE	SPECFICATIONS
1	Fan Motor	MMF-230-28A	Output (rated) 28W, 6 pole, 230V, 1 Phase 50Hz
2	Running Capacitor – fan motor	EEP2W205HQA107	AC 450V 2.0μF
3	Pulse Motor Valve	EDM-B40YPTR-7B-A	Capacity: 40

4-Way Cassette: MM-U056

No.	PARTS NAME	TYPE	SPECFICATIONS
1	Fan Motor	MMF-230-28A	Output (rated) 28W, 6 pole, 230V, 1 Phase 50Hz
2	Running Capacitor – fan motor	EEP2H105HQA105	AC 500V 1.0μF
3	Pulse Motor Valve	EDM-B40YPTR-7B-A	Capacity: 40

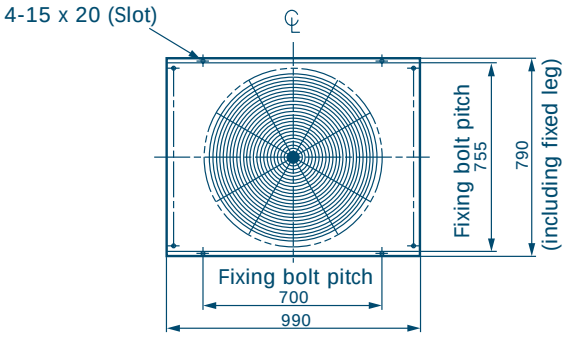
4-Way Cassette: MM-U140, MM-U112, MM-U080, MM-U056

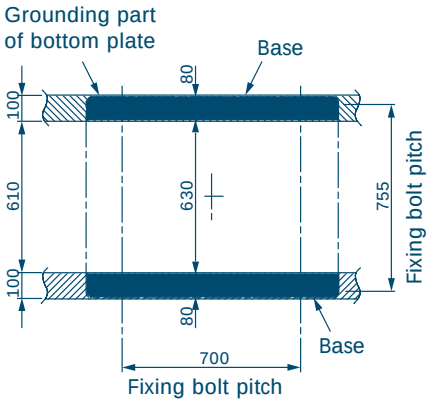
No.	PARTS NAME	TYPE	SPECFICATIONS					
4	Transformer	TT-03-1	DC 16.3V 0.5A/AC 11.6V 0.15A					
5	Pulse Motor	EDM-MD12TF-3	DC12V					
6	Pressure Sensor	150/100NH6-D	Power Voltage DC 12V					
7	Sensor for room temperature	TA	Maximum input	°C	25		50	
			38mA (at 25°C)	kΩ	10		3.45	
8	Sensor for heat exchanger	Tc1	Maximum input	°C	-12	0	25	50
			34mA (at 25°C)	kΩ	62.3	32.8	10	3.6
9	Sensor for heat exchanger	Tc2	Maximum input	°C	0	25	50	
			26mA (at 25°C)	kΩ	34.6	10	3.4	
10	Control PCB	CM**C02	AC 220-240V					
11	Power PCB	P**RC01	AC 220-240V					

Construction Views

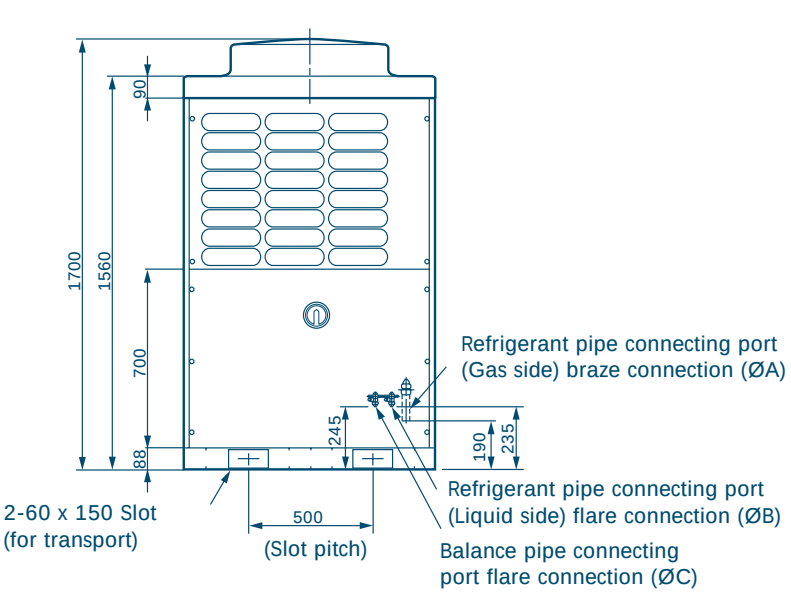
Outdoor Units

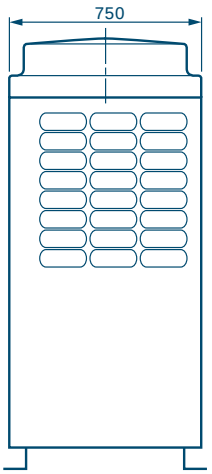
MM-A0280HT, MM-A0280HX, MM-A0224HT, MM-A0224HX, MM-A0160HX





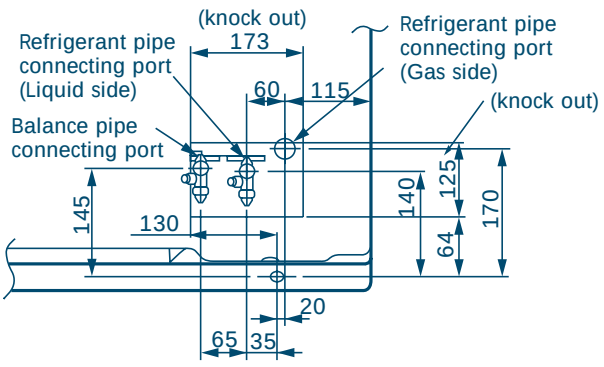
Base bolt position





Note: All dimensions in (mm)

Model	ØA mm	ØB mm	ØC mm
MM-A0280HT, MM-A0280HX	28.6	12.7	9.52
MM-A0224HT, MM-A0224HX	22.2	12.7	9.52
MM-A0160HX	22.2	9.52	9.52



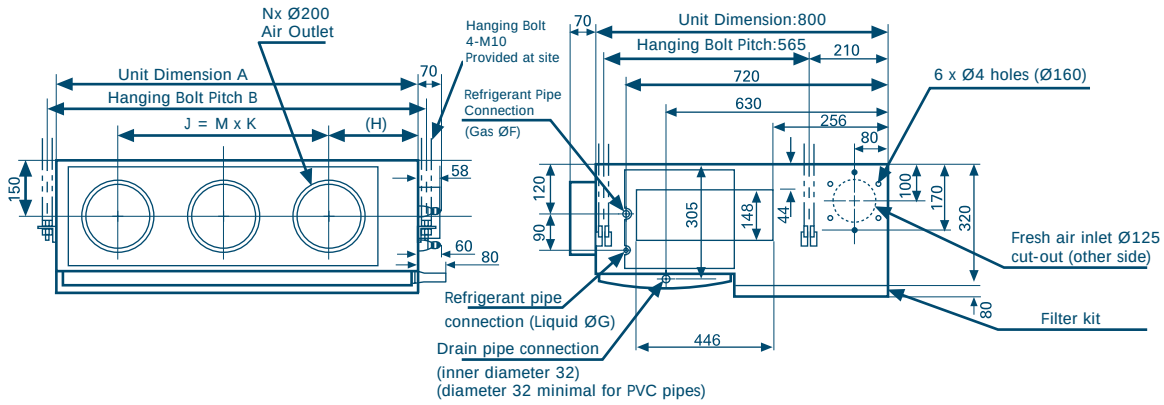
Details of piping connections

Construction Views

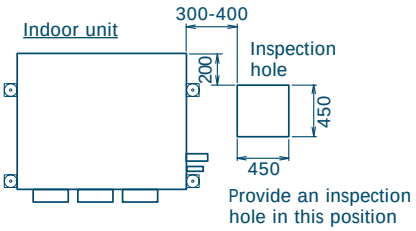
Indoor Units

Built-In Duct

MM-B056, MM-B080, MM-B112, MM-B140



Ensure that there is sufficient space around the indoor unit for installation and servicing



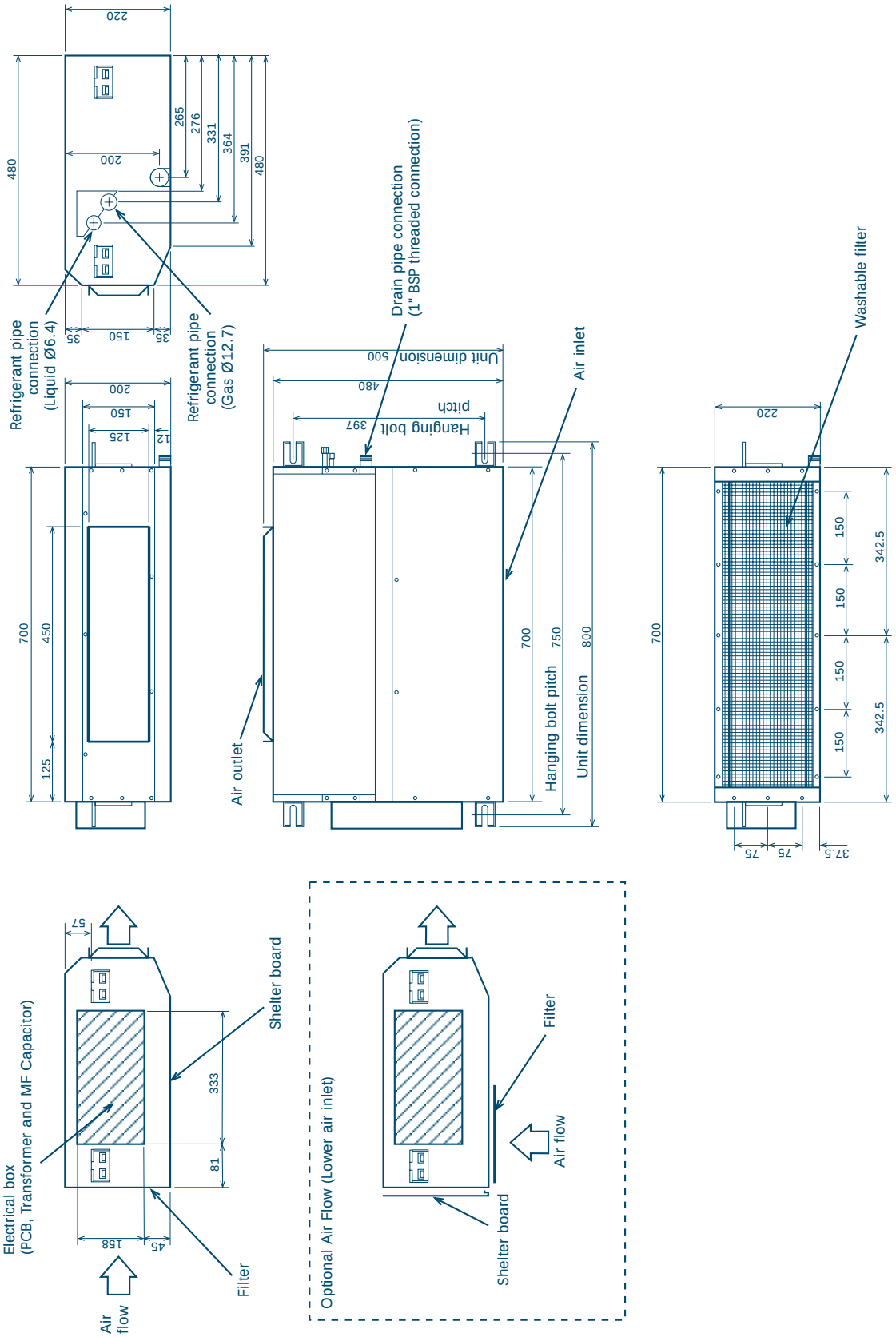
Model	A	B	E	ØF	ØG	H	J	K	M	N
MM-B056	700	750	780	12.7	6.4	252	280	280	1	2
MM-B080	1,000	1,050	1,080	15.9	9.5	252	580	290	2	3
MM-B112, B140	1,350	1,400	1,430	19.0	9.5	252	930	310	3	4

(Unit: mm)

Construction Views

Indoor Units

Built-In Slim Duct
MM-SB028

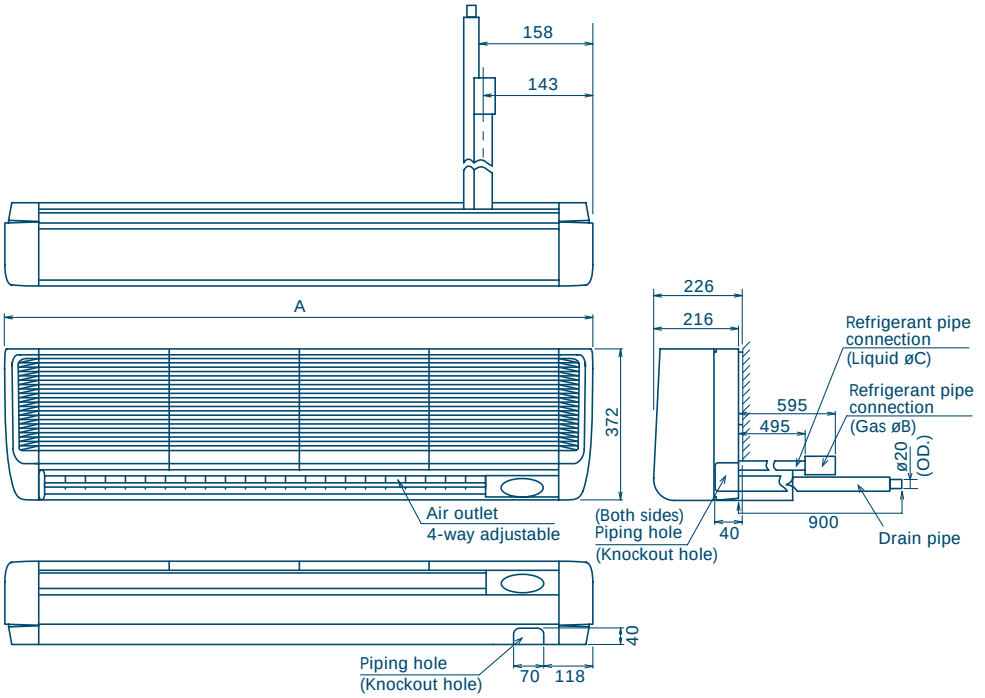


Construction Views

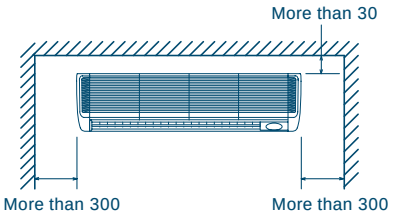
Indoor Units

High Wall

MM-K042, MM-K056, MM-K080, MM-KR042, MM-KR056, MM-KR080

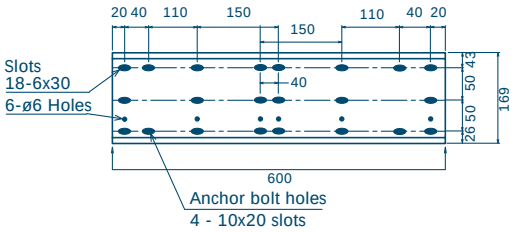


Model	A	B	C
MM-K042, MM-KR042	1149	12.6	6.4
MM-K056, MM-KR056	1149	12.7	6.4
MM-K080, MM-KR080	1478	15.9	9.5



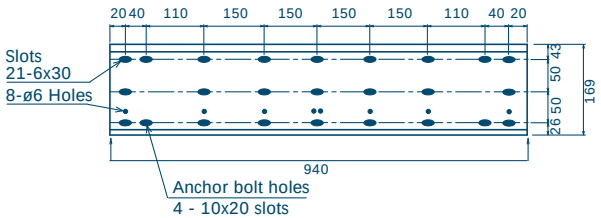
Space required for service

MM-K042, MM-KR042
MM-K056, MM-KR056



(unit : mm)

MM-K080, MM-KR080

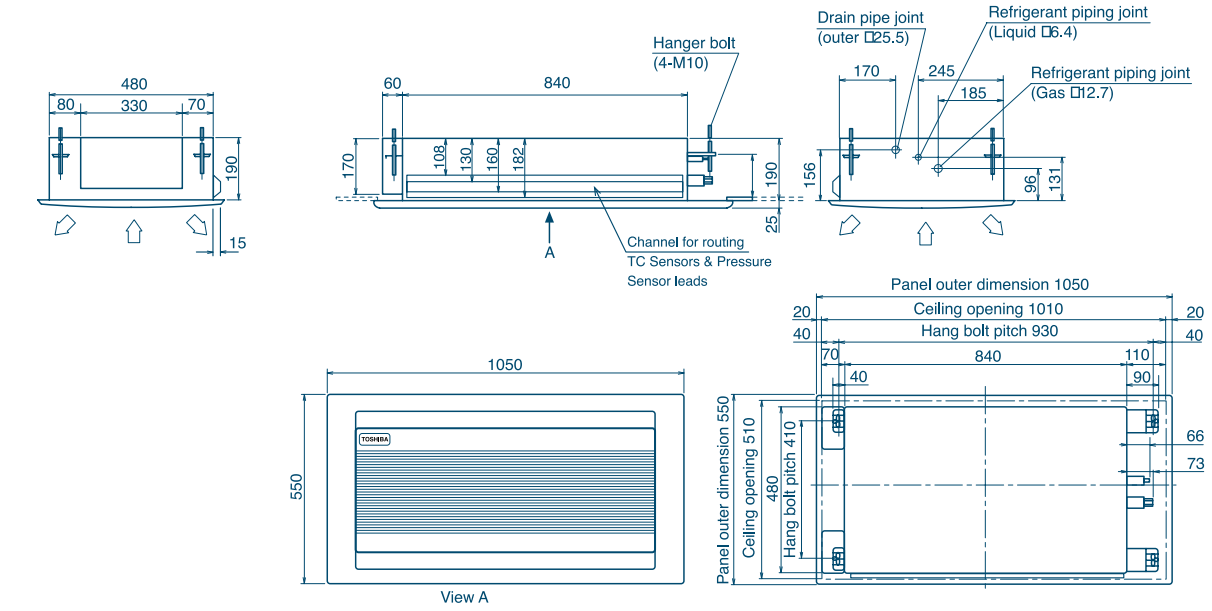


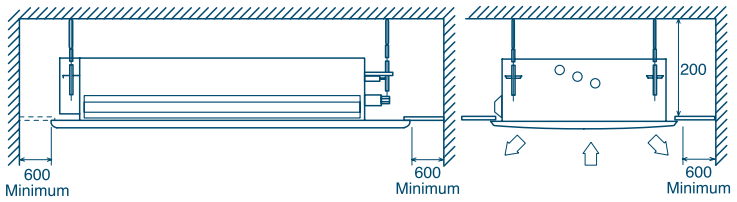
Installation board mounting bolt hole location

Construction Views

Indoor Units

2-Way Cassette
MM-TU028, MM-TU042, MM-TU056





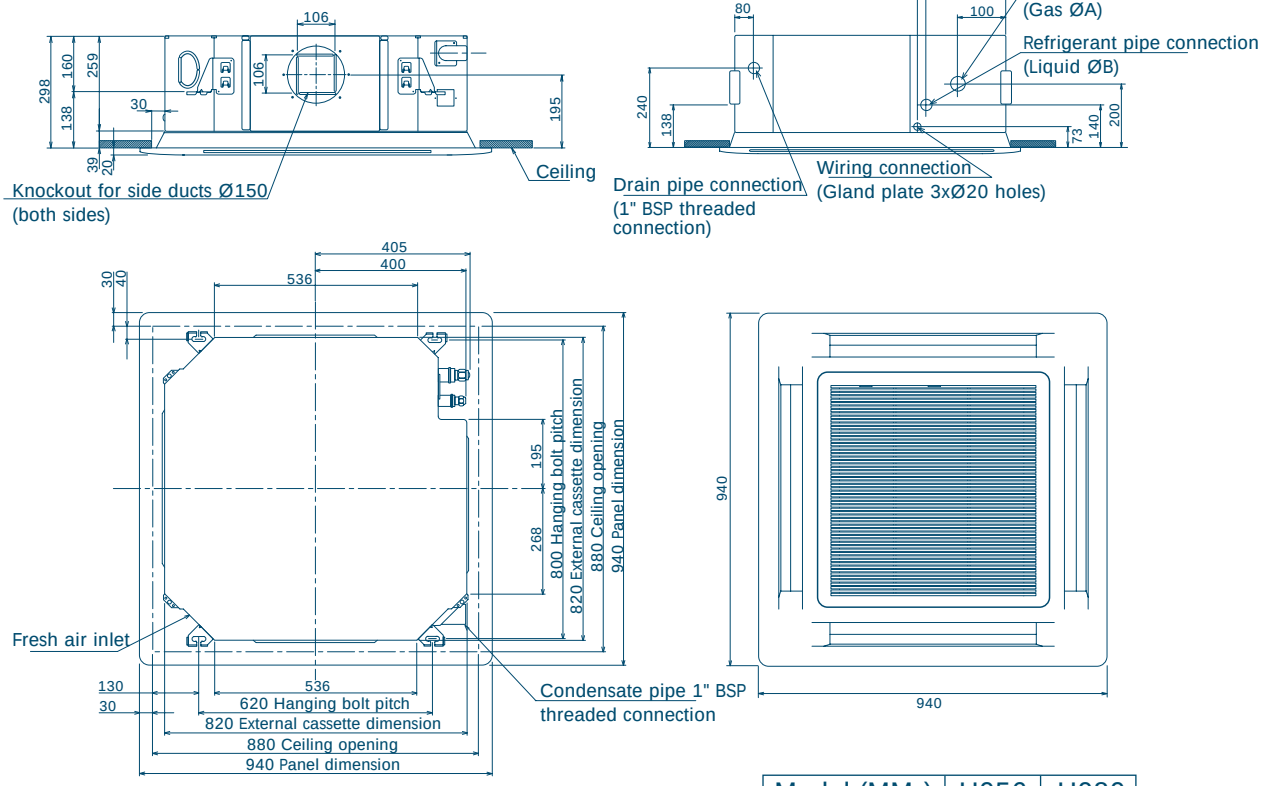
(Unit: mm)

Space required for service and installation

Construction Views

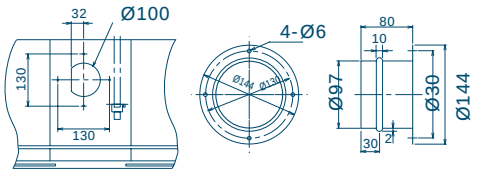
Indoor Units

4-Way Cassette
MM-U056, MM-U080

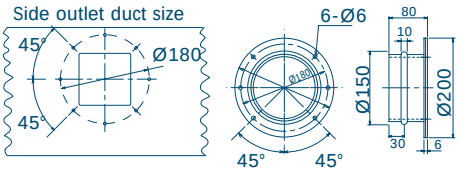


Model (MM-)	U056	U080
ØA	12.7	15.9
ØB	6.4	9.5

Fresh air inlet duct size



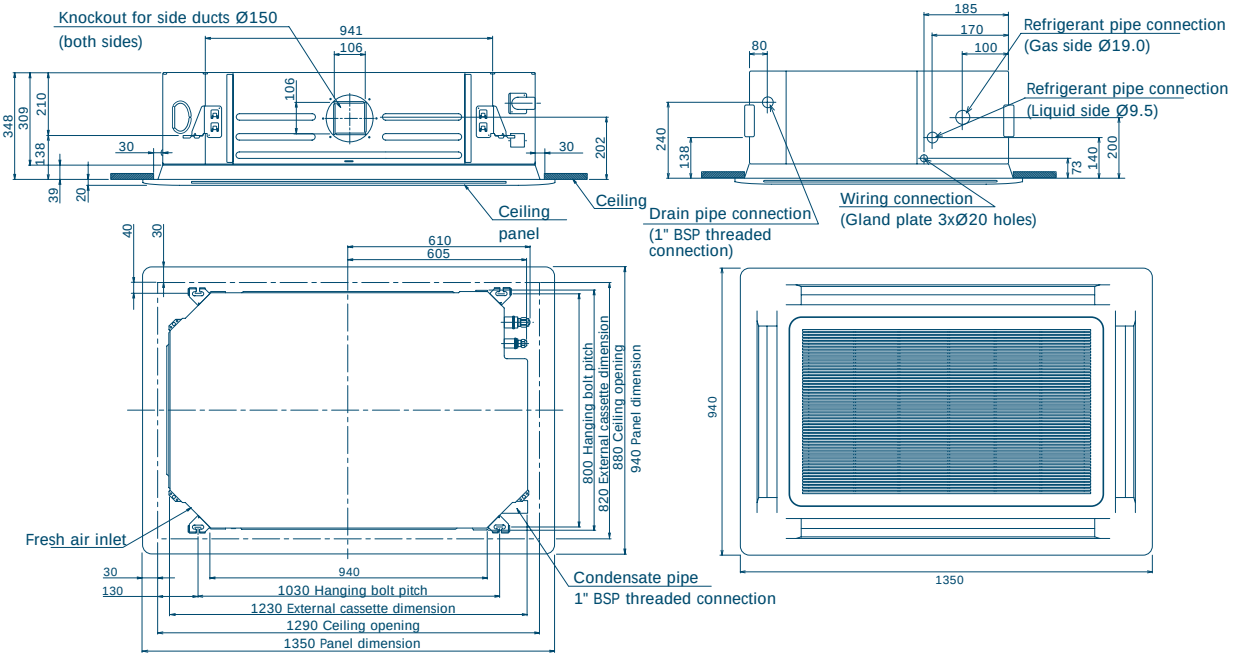
Side outlet duct size

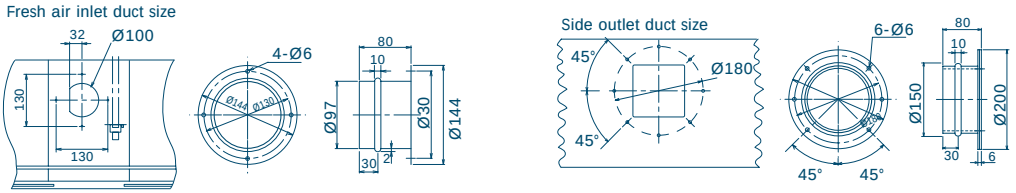


Construction Views

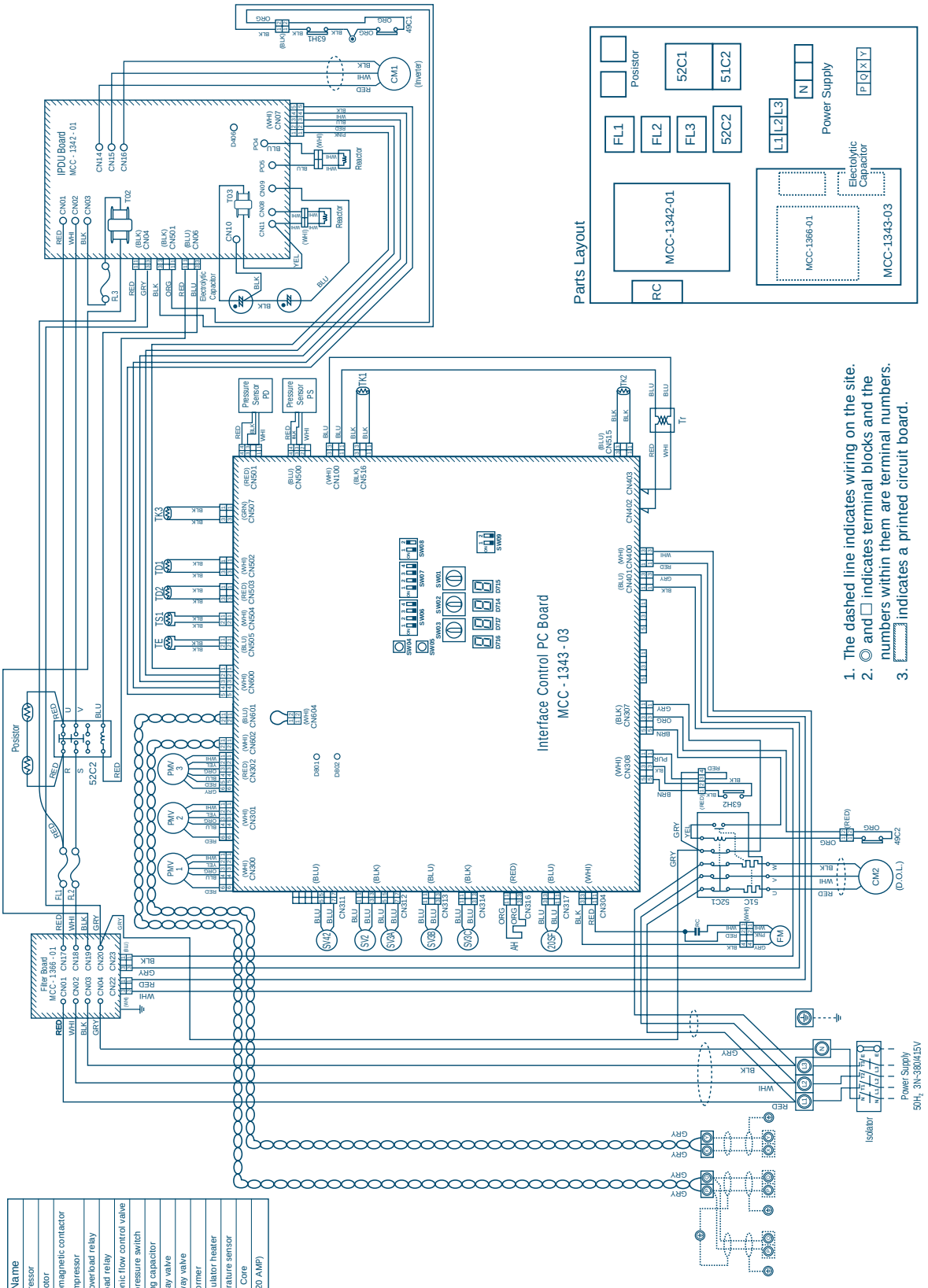
Indoor Units

4-Way Cassette
MM-U112, MM-U140



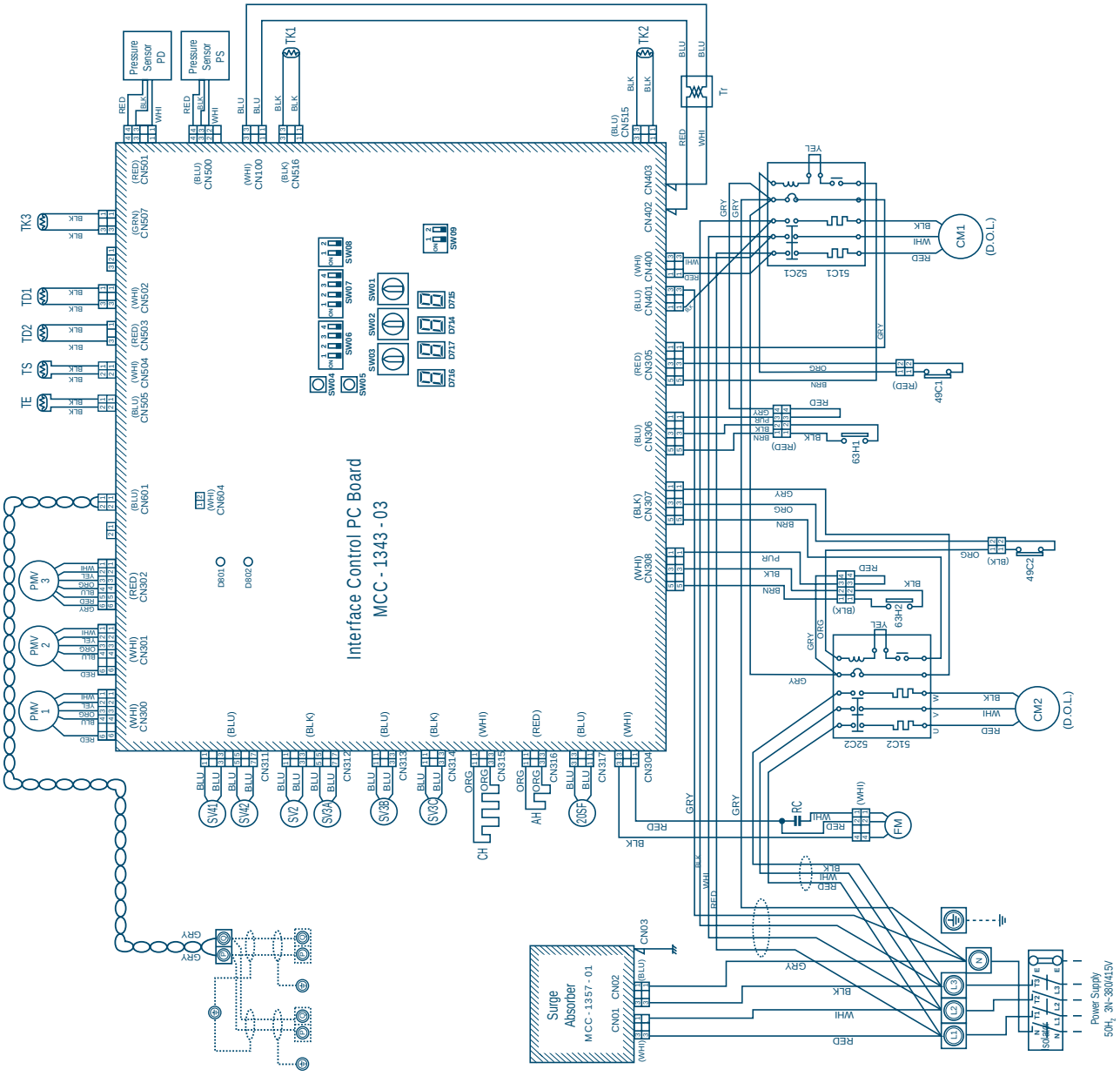


Inverter Unit (10HP, 8HP)
MM-A0280HT, MM-A0224HT



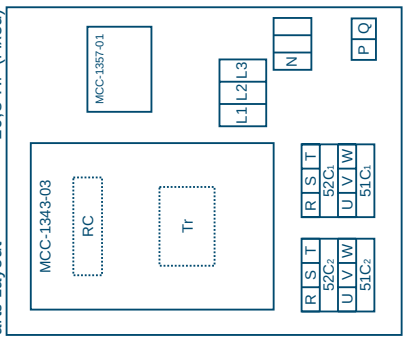
Symbol	Part Name
CM 1, 2	Compressor
FM	Fan motor
52C 1, 2	Electromagnetic contactor for compressor
49C 1, 2	Inner overload relay
51C	Overload relay
PMV 1, 2, 3	Electronic flow control valve
63H 1, 2	High pressure switch
RC	Running capacitor
SV 4C, 2, 3A, 3B, 3C	Two-way valve
20SF	Four-way valve
Tr	Transformer
AH	Accumulator heater
TD1, 2 TE TK1, 2, 3 TS	Temperature sensor
	Ferrite Core
FL 1, 2, 3	Fuse (20 AMP)

Fixed Speed Unit (10-HP, 8HP)
MM-A0280HX, MM-A0224HX



Symbol	Part Name
CM 1, 2	Compressor
FM	Fan motor
52C 1, 2	Electromagnetic contactor for compressor
49C 1, 2	Inner overload relay
51C 1, 2	Overload relay
PMV 1, 2, 3	Electronic flow control valve
63H 1, 2	High pressure switch
RC	Running capacitor
SV 41, 42, 2, 3A, 38, 3C	Two-way valve
20SF	Four-way valve
CH	Crank case heater
Tr	Transformer
AH	Accumulator heater
TD1, 2 TE TK1, 2, 3 TS	Temperature sensor
	Ferrite Core

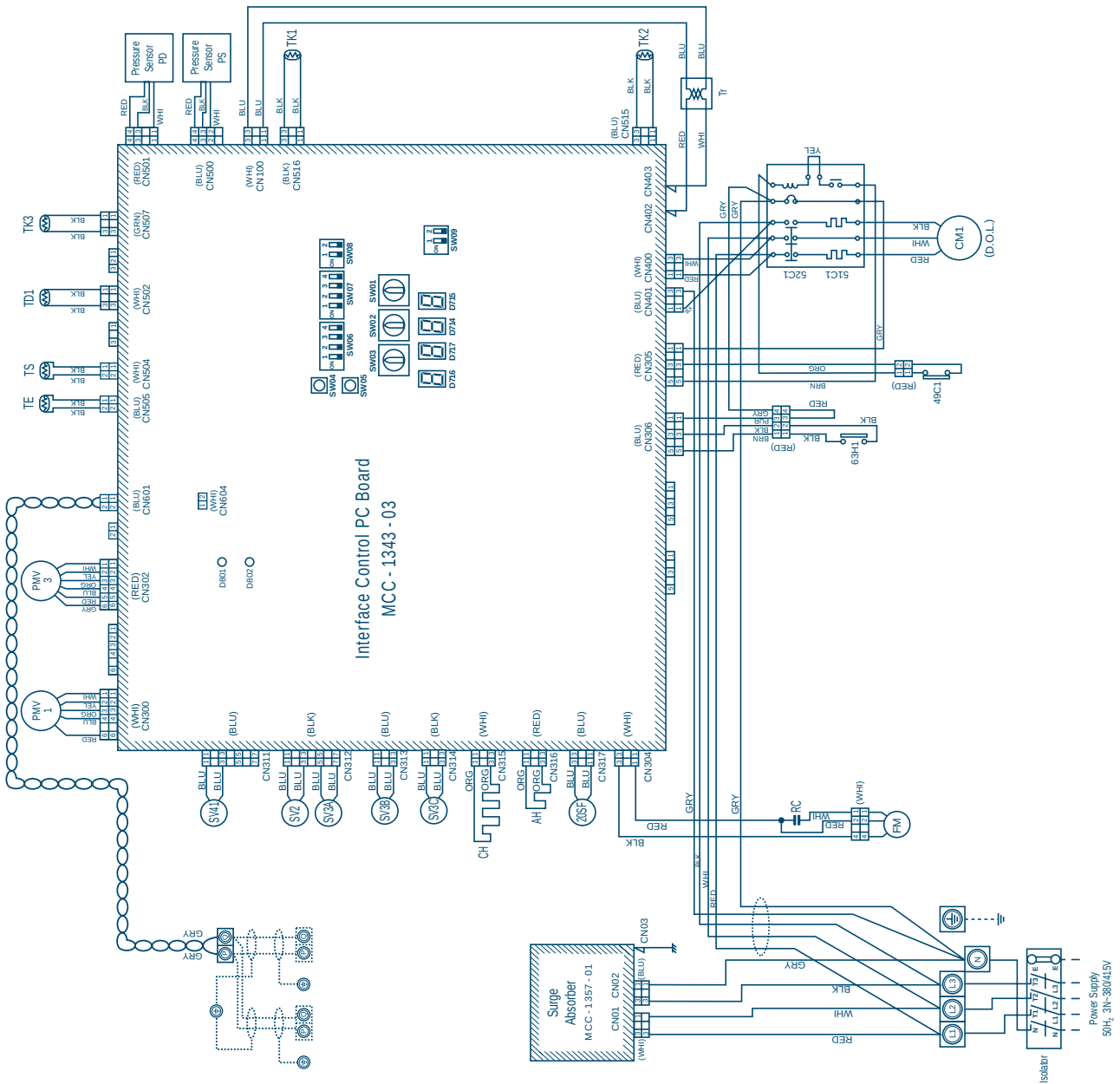
Parts Layout 10,8 HP (Fixed)



1. The dashed line indicates wiring on the site.
2. ◎ and □ indicates terminal blocks and the numbers within them are terminal numbers.
3. ▭ indicates a printed circuit board.

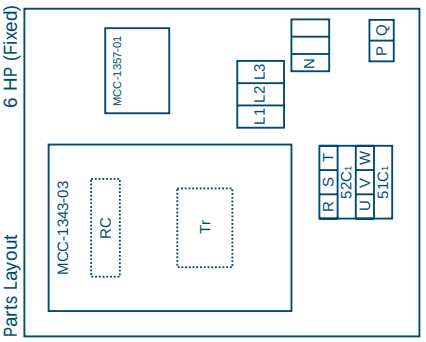
Fixed Speed Unit (6HP)

MM-A0160HX



Symbol	Part Name
CM 1	Compressor
FM	Fan motor
52C 1	Electromagnetic contactor for compressor
49C 1	Inner overload relay
51C 1	Overload relay
PMV 1, 3	Electronic flow control valve
63H 1	High pressure switch
RC	Running capacitor
SV 41, 2, 3A, 3B, 3C	Two-way valve
20SF	Four-way valve
CH	Crank case heater
Tr	Transformer
AH	Accumulator heater
TD1, 2, 3 TE TK1 TS	Temperature sensor
	Ferrite Core

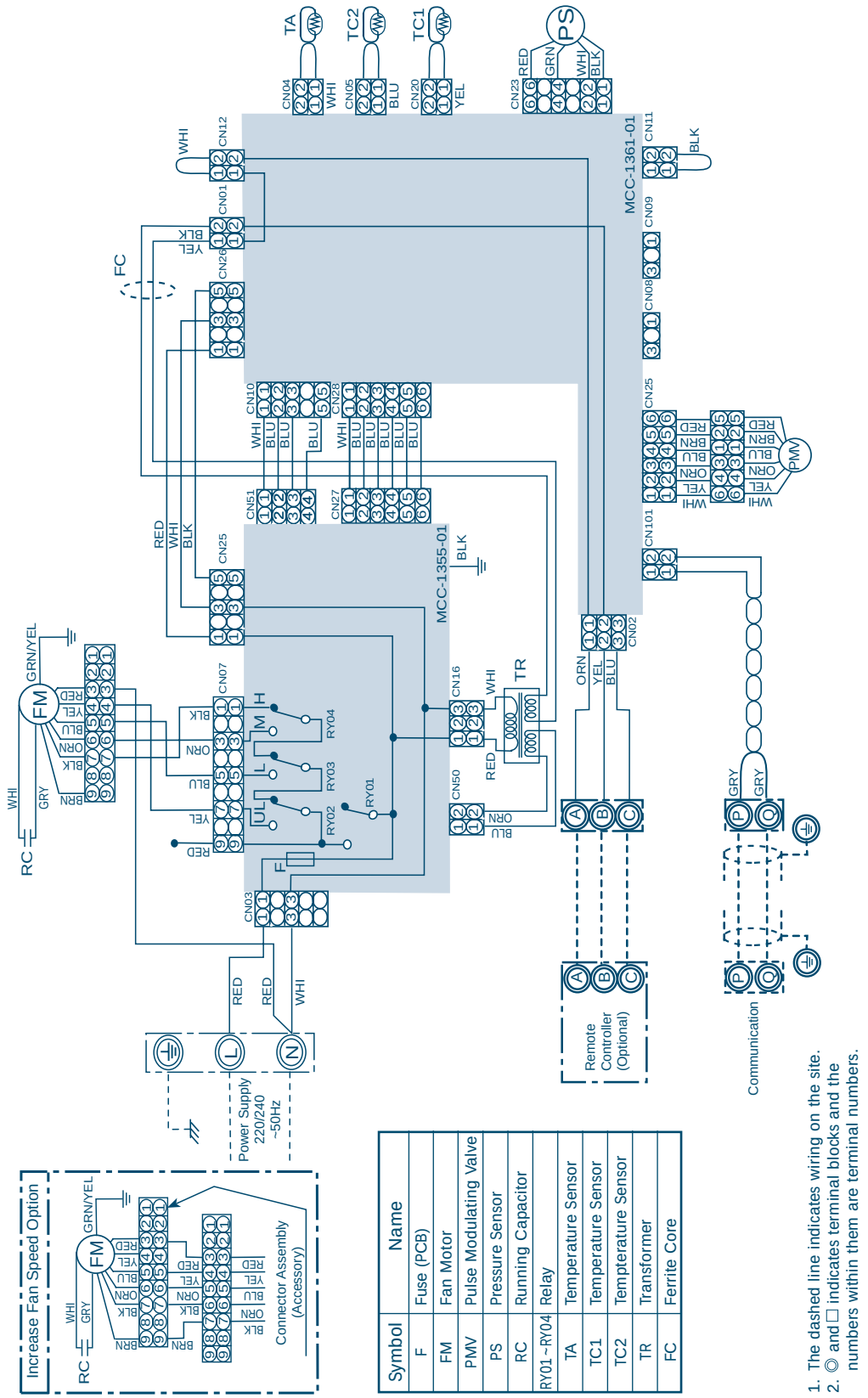
Parts Layout 6 HP (Fixed)



1. The dashed line indicates wiring on the site.
2. ◎ and □ indicates terminal blocks and the numbers within them are terminal numbers.
3. ▭ indicates a printed circuit board.

Built-In Duct

MM-B140, MM-B112, MM-B080, MM-B056

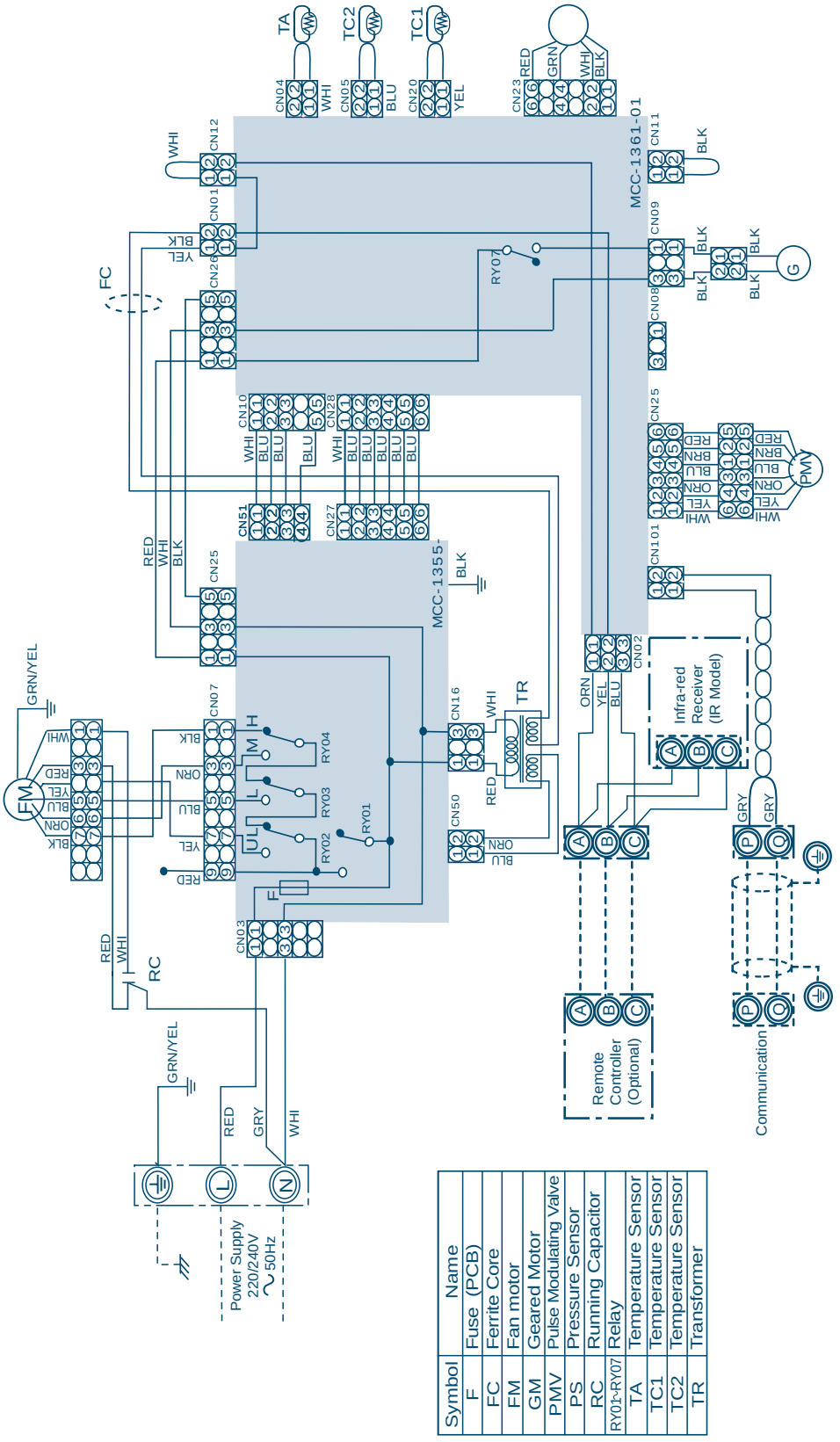


Symbol	Name
F	Fuse (PCB)
FM	Fan Motor
PMV	Pulse Modulating Valve
PS	Pressure Sensor
RC	Running Capacitor
RY01~RY04	Relay
TA	Temperature Sensor
TC1	Temperature Sensor
TC2	Tempterature Sensor
TR	Transformer
FC	Ferrite Core

1. The dashed line indicates wiring on the site.
2. ◎ and □ indicates terminal blocks and the numbers within them are terminal numbers.

Indoor Units

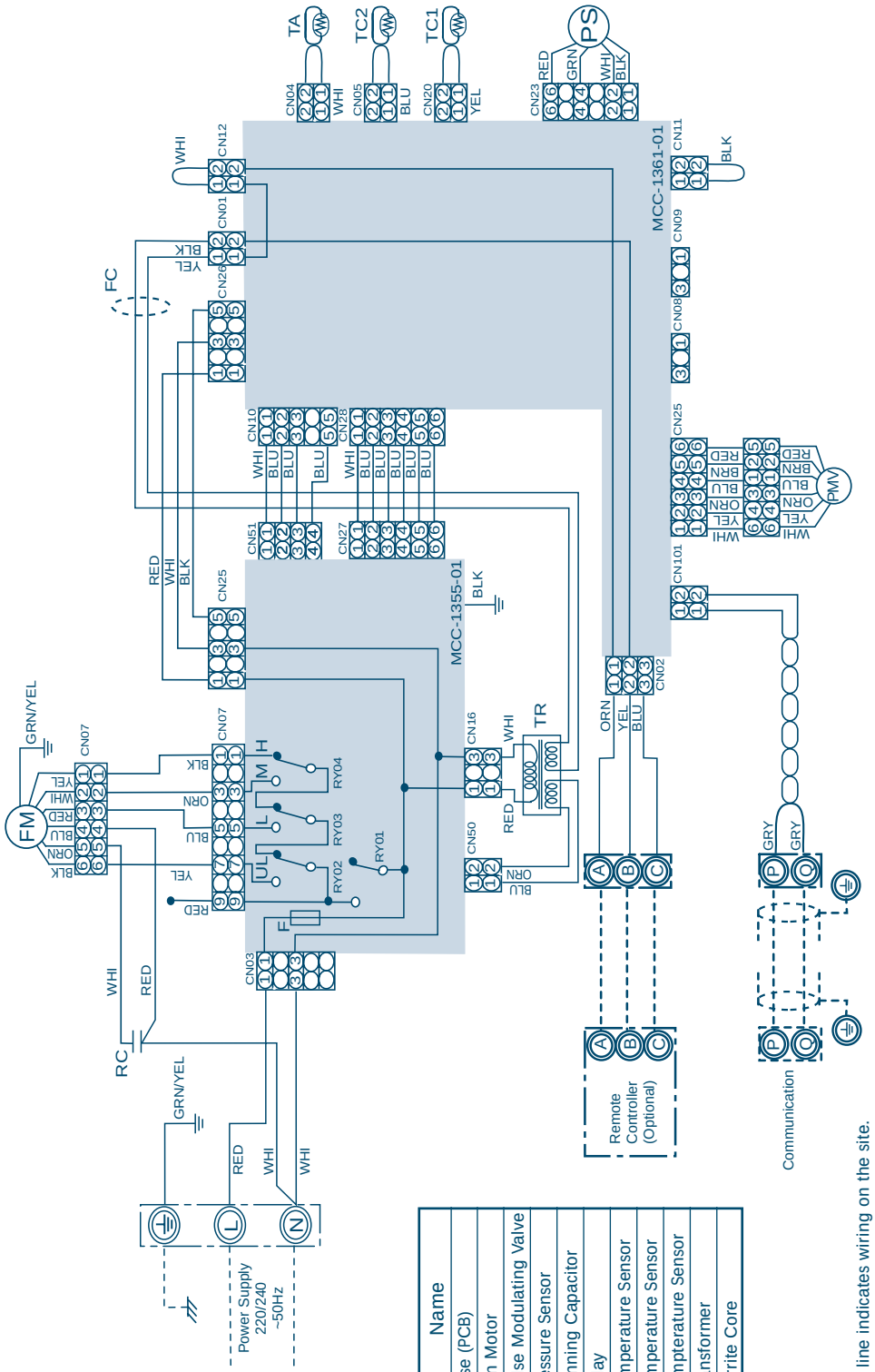
Wall Unit
MM-K042, MM-K056, MM-K080,
MM-KR042, MM-KR056, MM-KR080



Symbol	Name
F	Fuse (PCB)
FC	Ferrite Core
FM	Fan motor
GM	Geared Motor
PMV	Pulse Modulating Valve
PS	Pressure Sensor
RC	Running Capacitor
RY01~RY07	Relay
TA	Temperature Sensor
TC1	Temperature Sensor
TC2	Temperature Sensor
TR	Transformer

1. The dashed line indicates wiring on the site.
2. ◎ and □ indicates terminal blocks and the numbers within them are terminal numbers.

Built-In Slim Duct
MM-SB028

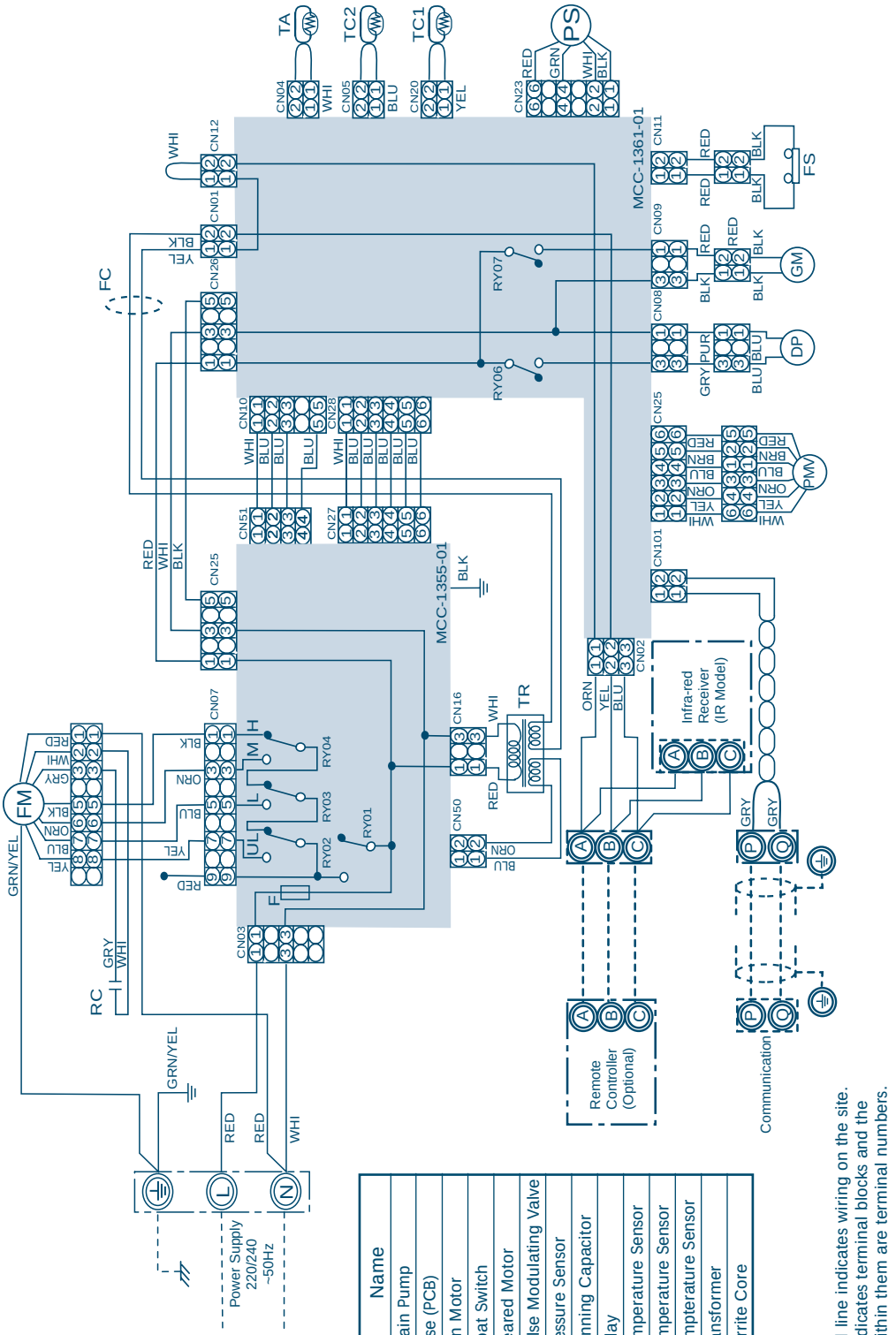


Symbol	Name
F	Fuse (PCB)
FM	Fan Motor
PMV	Pulse Modulating Valve
PS	Pressure Sensor
RC	Running Capacitor
RY01~RY04	Relay
TA	Temperature Sensor
TC1	Temperature Sensor
TC2	Tempterature Sensor
TR	Transformer
FC	Ferrite Core

1. The dashed line indicates wiring on the site.
2. ◎ and □ indicates terminal blocks and the numbers within them are terminal numbers.

4-Way Cassette

MM-U140, MM-U112, MM-U080, MM-U056

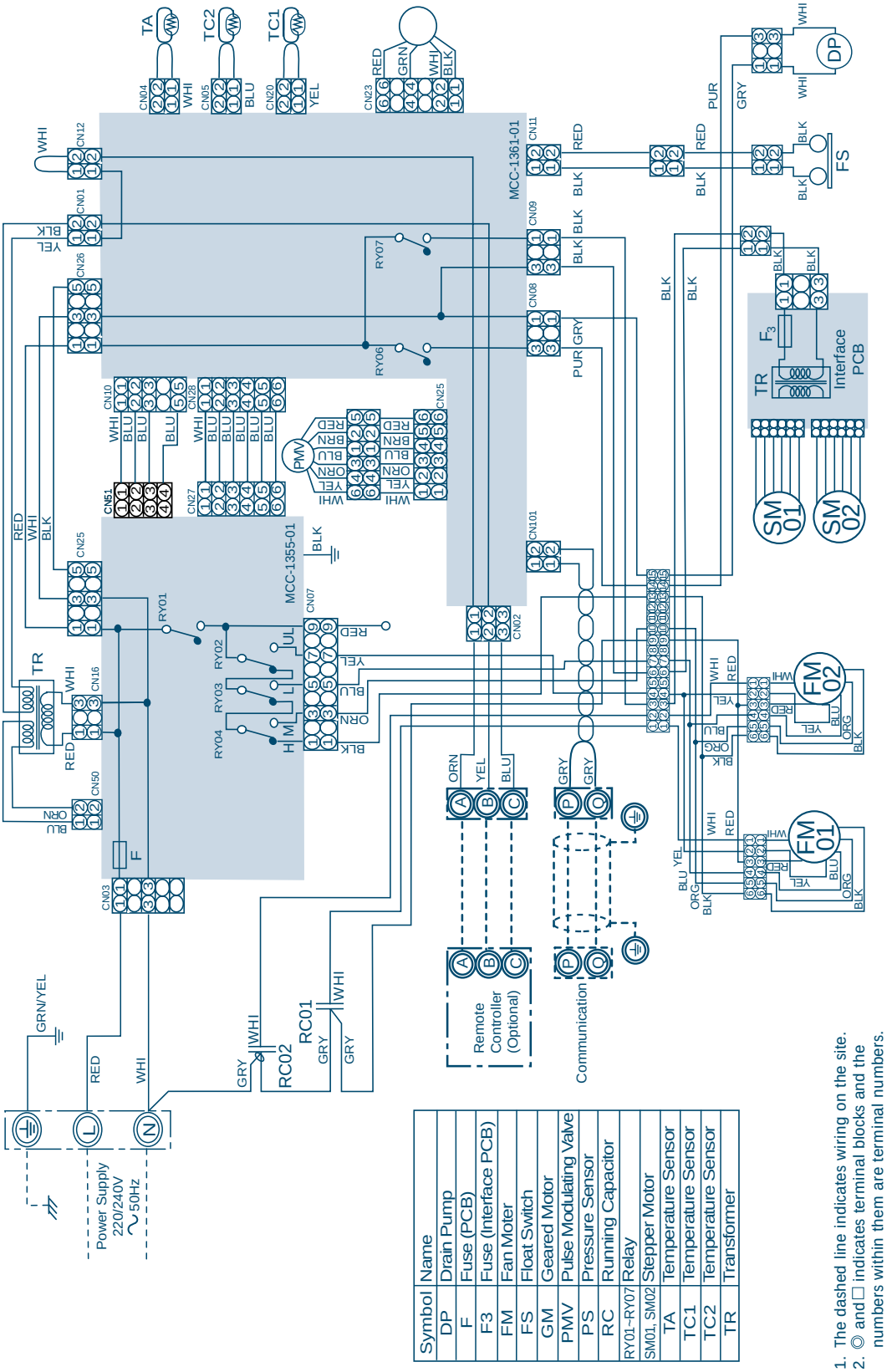


Symbol	Name
D	Drain Pump
F	Fuse (PCB)
FM	Fan Motor
FS	Float Switch
GM	Geared Motor
PMV	Pulse Modulating Valve
PS	Pressure Sensor
RC	Running Capacitor
RY01~RY07	Relay
TA	Temperature Sensor
TC1	Temperature Sensor
TC2	Tempterature Sensor
TR	Transformer
FC	Ferrite Core

1. The dashed line indicates wiring on the site.
2. ◎ and□ indicates terminal blocks and the numbers within them are terminal numbers.

2-Way Cassette

MM-TU028, MM-TU042, MM-TU056

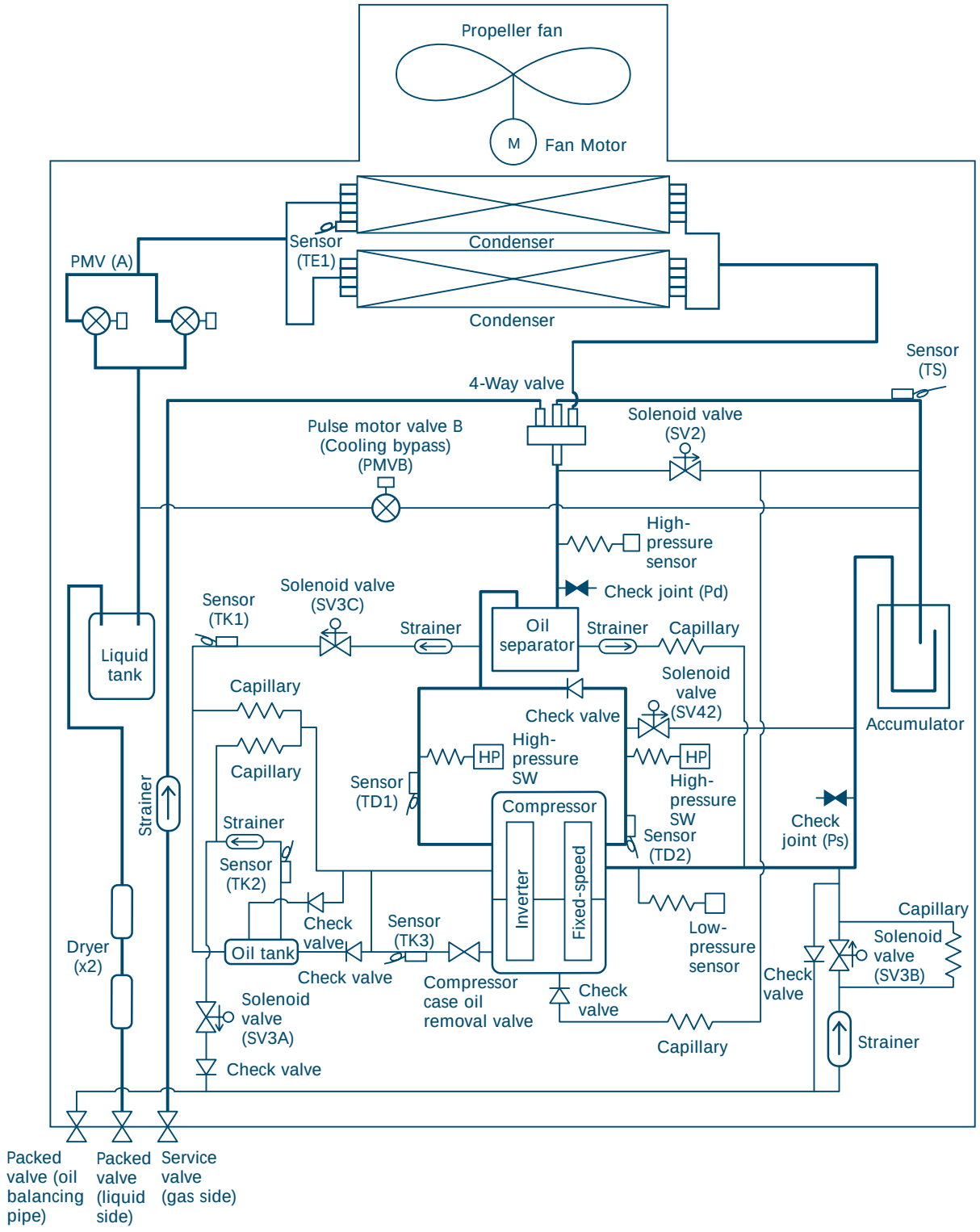


Symbol	Name
DP	Drain Pump
F	Fuse (PCB)
F3	Fuse (Interface PCB)
FM	Fan Moter
FS	Float Switch
GM	Geared Motor
PMV	Pulse Modulating Valve
PS	Pressure Sensor
RC	Running Capacitor
RY01~RY07	Relay
SM01, SM02	Stepper Motor
TA	Temperature Sensor
TC1	Temperature Sensor
TC2	Temperature Sensor
TR	Transformer

1. The dashed line indicates wiring on the site.
2. ◎ and □ indicates terminal blocks and the numbers within them are terminal numbers.

Inverter Unit (10HP, 8HP)

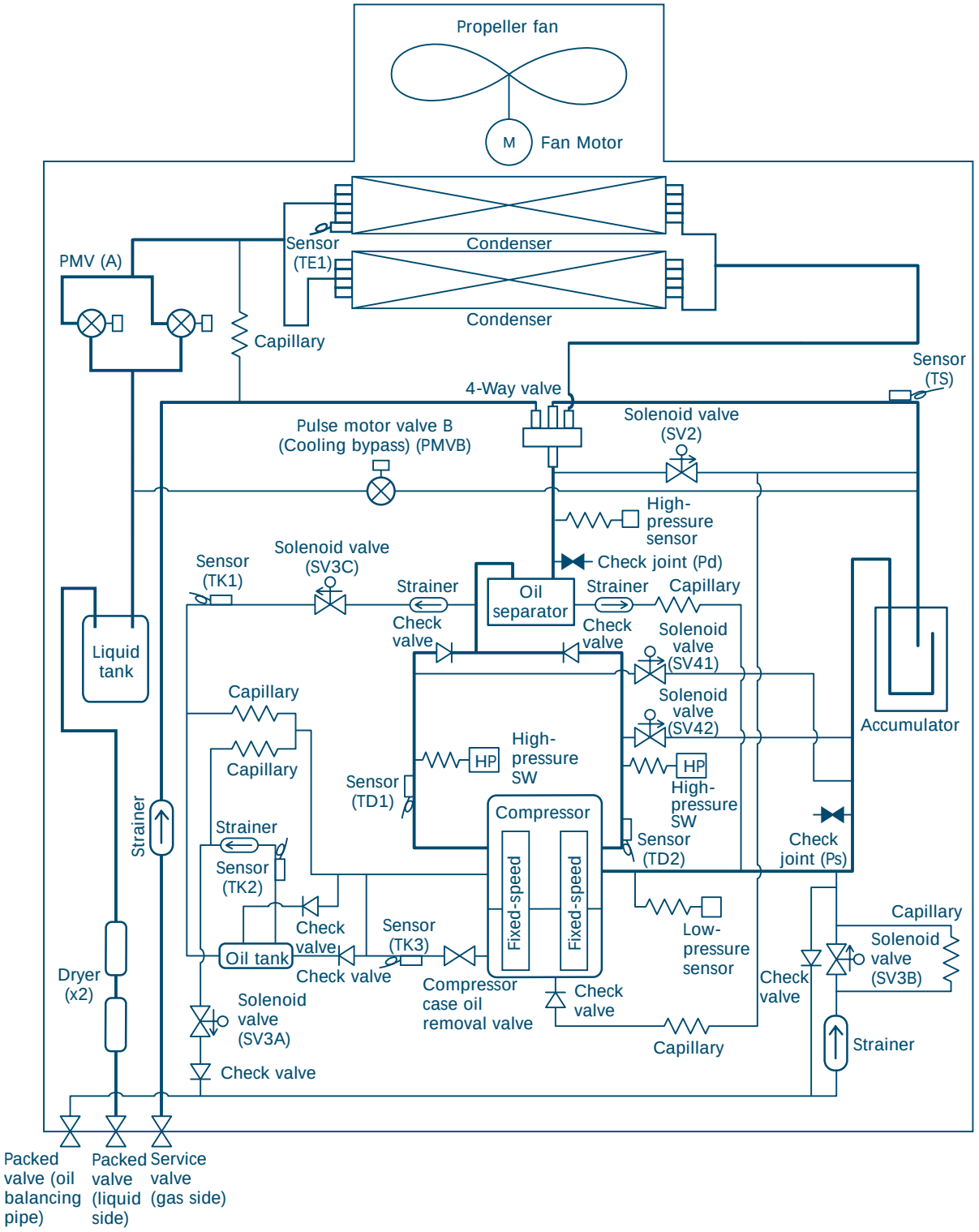
Model: MM-A0280HT, MM-A0224HT



Refrigerant Piping Systematic Drawings

Fixed Speed Unit (10HP, 8HP)

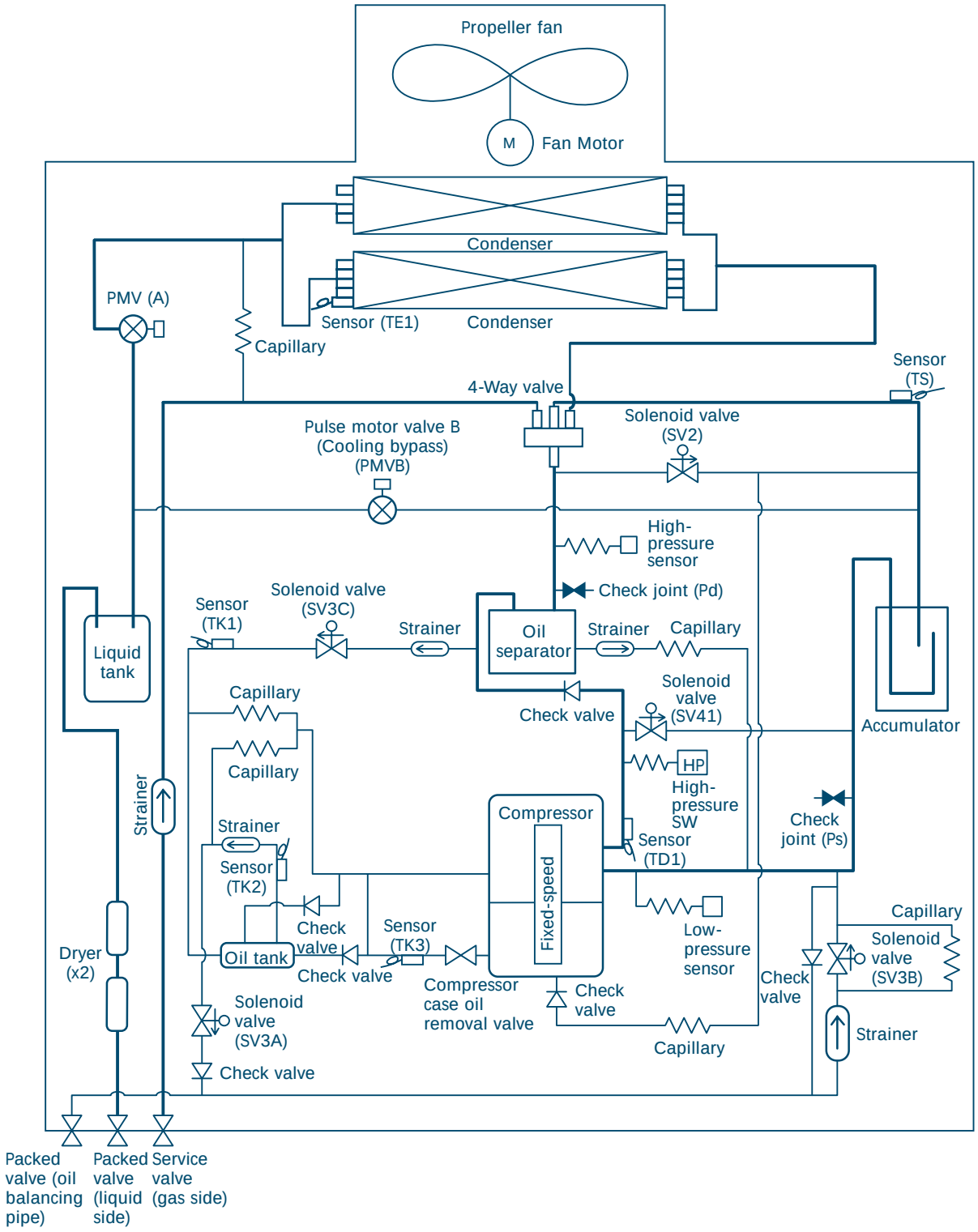
Model: MM-A0280HX, MM-A0224HX



Refrigerant Piping Systematic Drawings

Fixed Speed Unit (6HP)

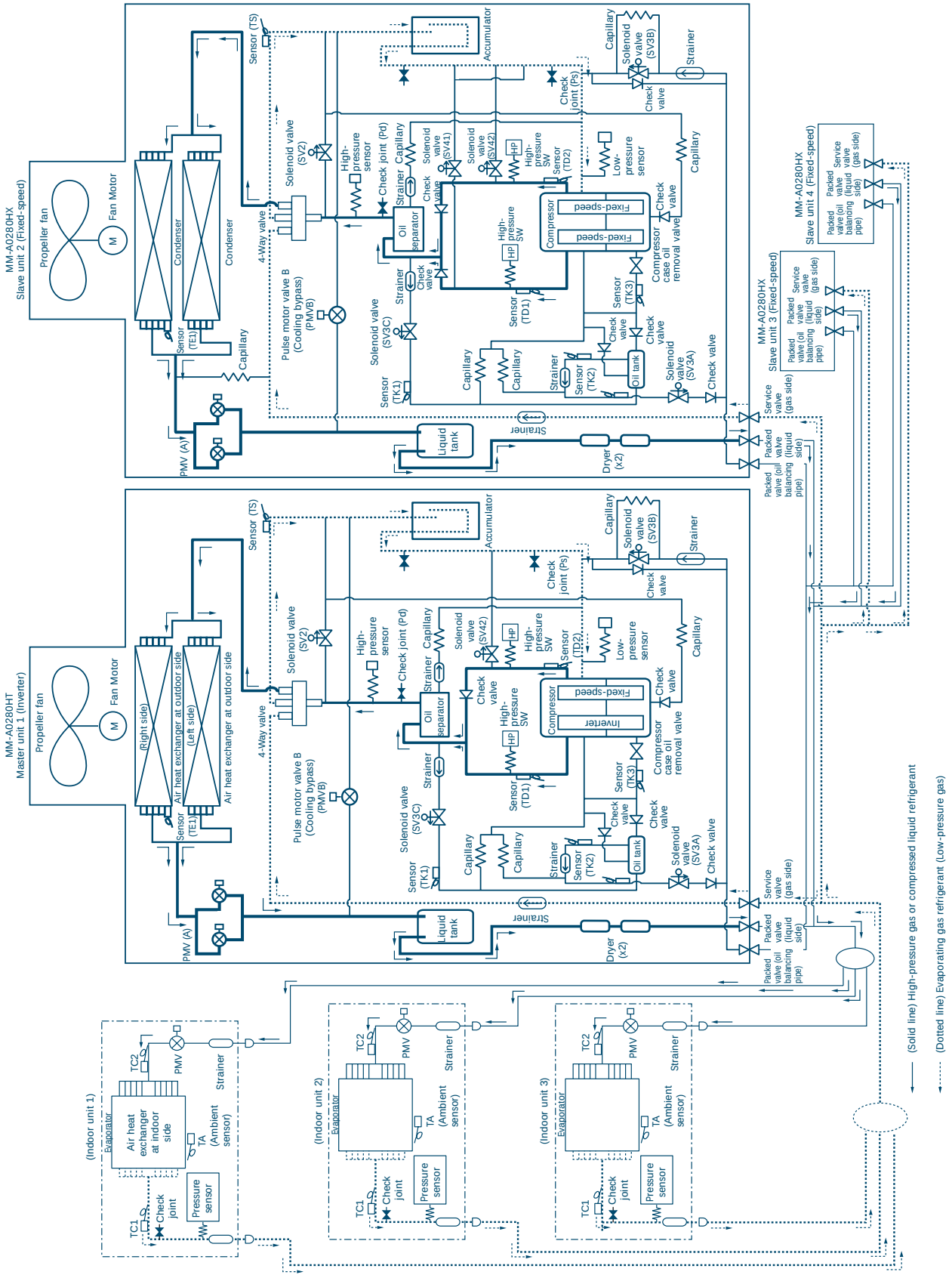
Model: MM-A0160HX



Combined Refrigerant Piping Systematic Drawings

Normal Operation

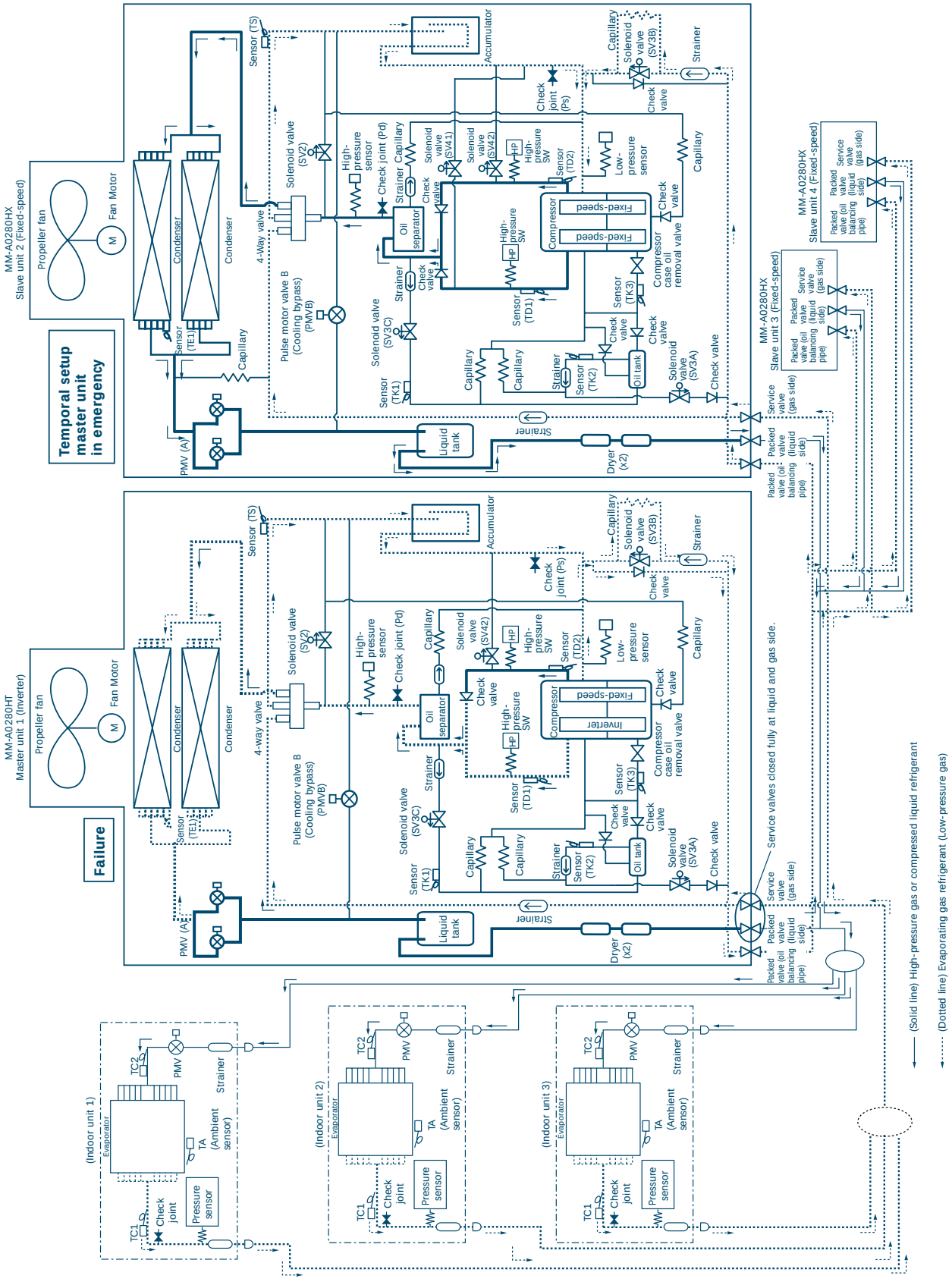
(Cooling mode)



Combined Refrigerant Piping Systematic Drawings

Emergency Operation when Inverter Unit has Failed

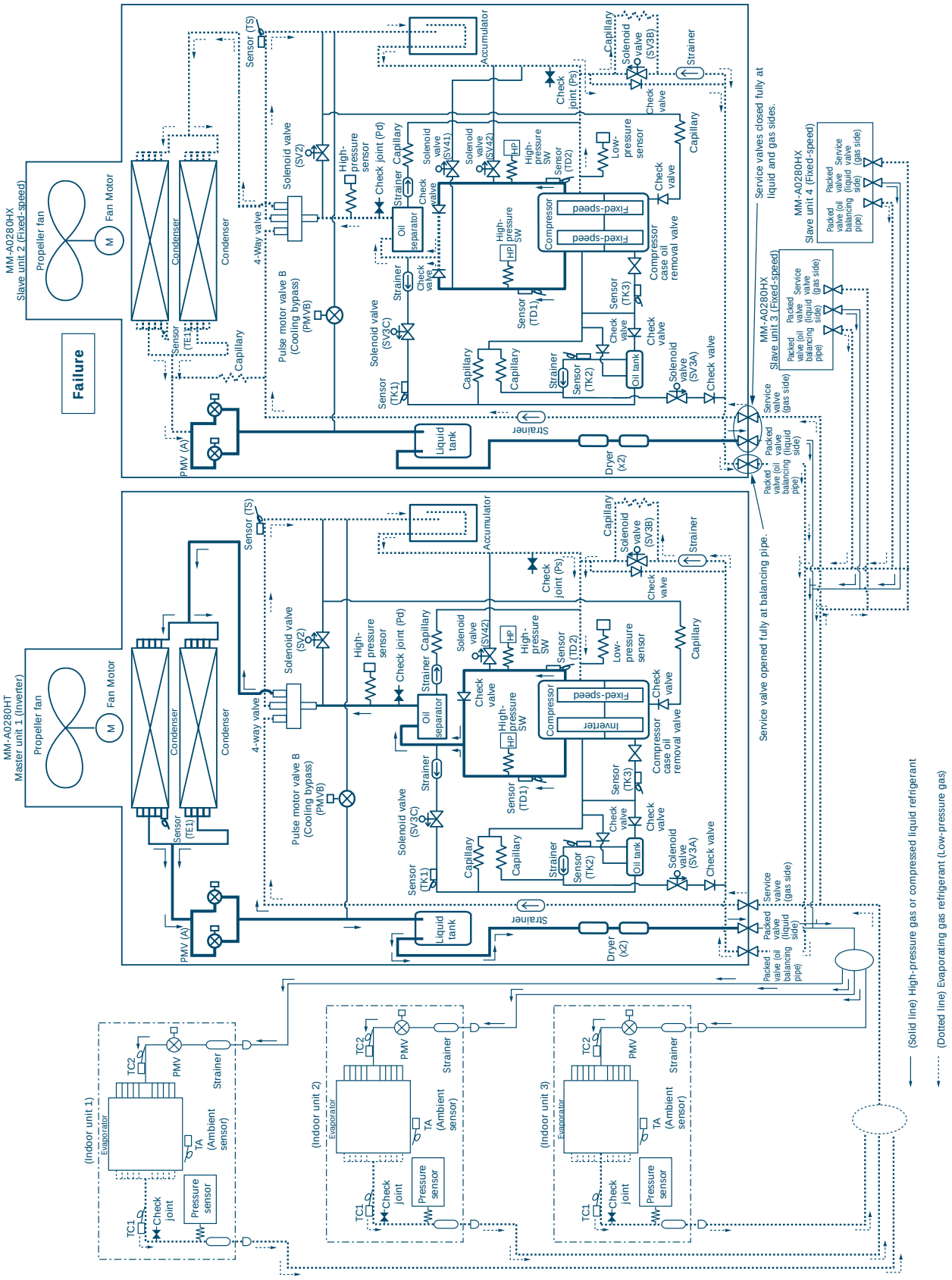
(Master unit back-up operation: Cooling mode)



Combined Refrigerant Piping Systematic Drawings

Emergency Operation when Fixed-Speed Unit has Failed

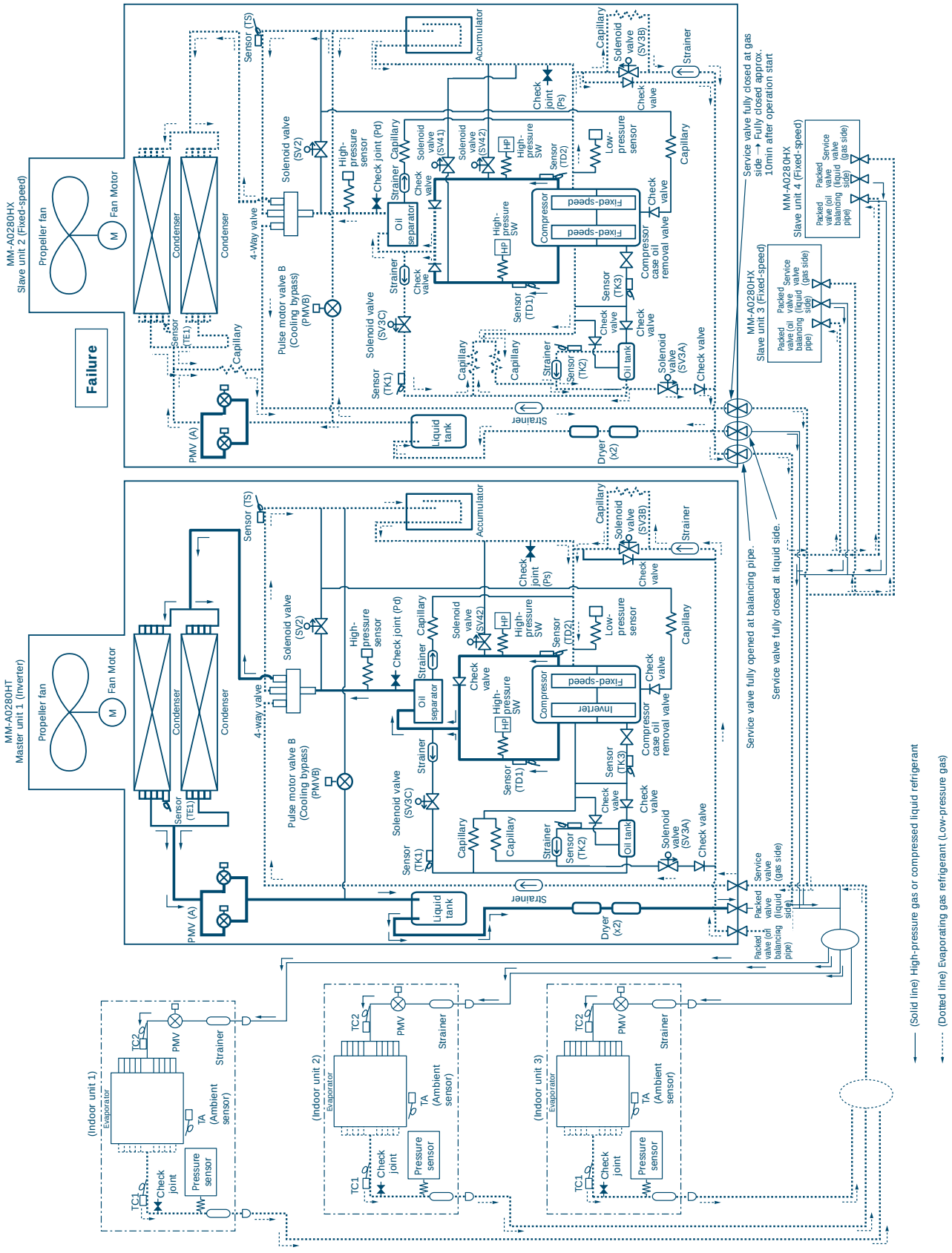
(Cooling mode)



Combined Refrigerant Piping Systematic Drawings

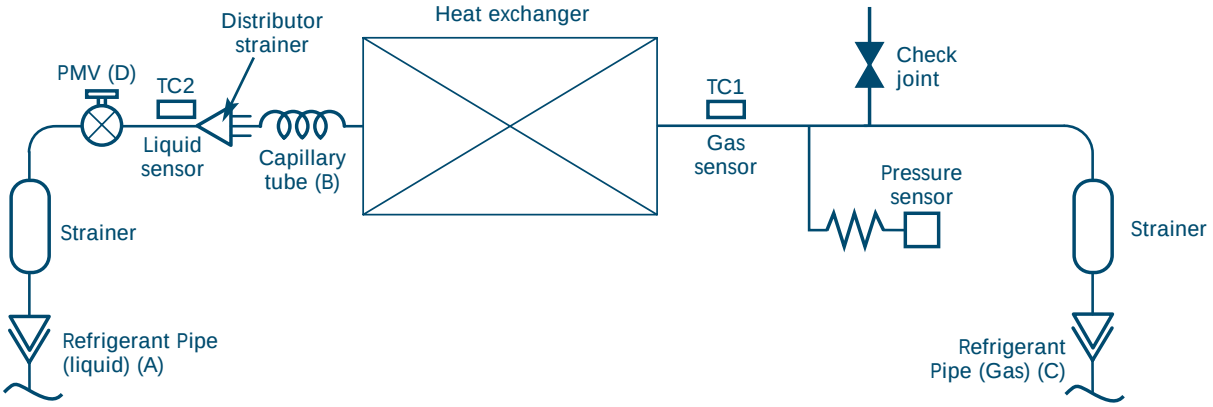
Recovery of Refrigerant in Failed Outdoor Unit

(Normal outdoor unit refrigerant recovery)



Refrigeration Cycle Schematic

Indoor Units

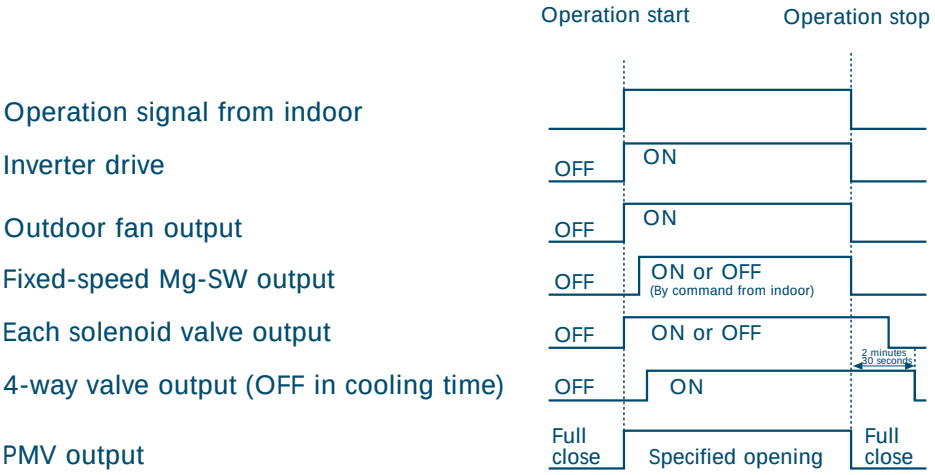


Model			Ø(A) mm	Capillary Ø(B) mm	Ø(C) mm	PMV (D) Code
BUILT-IN DUCT	MM-B	056	6.4	Ø1.7x150L x3	12.7	40
		080	9.5	Ø2.6x200L x4, Ø2.6x400L x2	15.9	40
		112	9.5	Ø2.2x200L x6	19.0	40
		140	9.5	Ø2.2x200L x6	19.0	60
CEILING	MM-C MM-CR	042	6.4		12.7	25
		056	6.4		12.7	40
		080	9.5		15.9	40
		112	9.5		19.0	40
		140	9.5		19.0	60
HIGH WALL	MM-K MM-KR	042	6.4	Ø3.0x200L x1, Ø3.0x100L x3	12.7	25
		056	6.4	Ø3.0x200L x1, Ø3.0x100L x3	12.7	40
		080	9.5	Ø3.0x200L x1, Ø3.0x100L x5	15.9	40
CARCASE	MM-N	028	6.4		12.7	25
		042	6.4		12.7	25
		056	6.4		12.7	40
		080	9.5		15.9	40
LOW WALL	MM-S MM-SR	056	6.4		12.7	40
		080	9.5		15.9	40
BUILT-IN SLIM DUCT	MM-SB	028	6.4	Ø1.7x250L x2	12.7	25
2 WAY CASSETTE	MM-TU	028	6.4	Ø2.4x300L x2	12.7	25
		042	6.4	Ø2.4x300L x2	12.7	25
		056	6.4	Ø2.2x200L x2	12.7	40
4 WAY CASSETTE	MM-U	056	6.4	Ø2.0x200L x3	12.7	40
		080	9.5	2.6x(150Lx2), (200Lx3), (400Lx1)	15.9	40
		112	9.5	2.6x(200Lx6), (300Lx2), (500Lx2)	19.0	40
		140	9.5	2.6x(200Lx6), (300Lx2), (500Lx2)	19.0	60

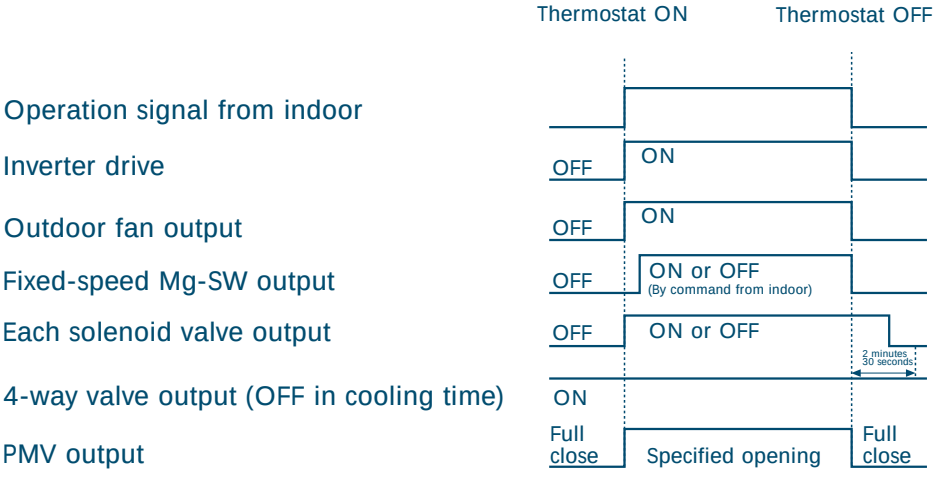
Outdoor Unit

Operation start/Operation end

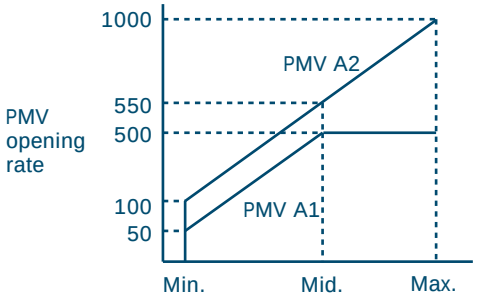
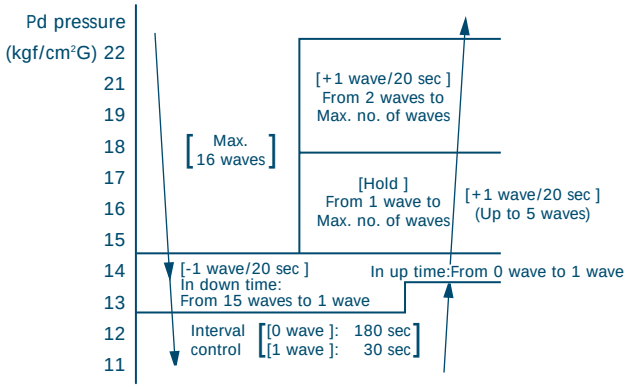
The compressor, solenoid valve, pulse motor valve (PMV), outdoor fan, etc. are controlled by a command from the indoor controller. The slave outdoor unit starts/stops by a command from the master outdoor unit.



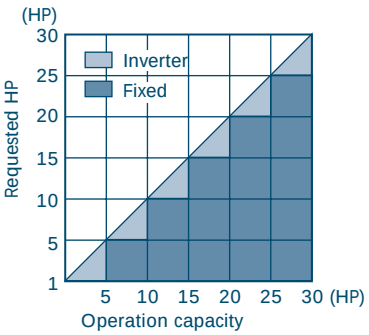
Thermostat ON/Thermostat OFF



Outdoor Unit

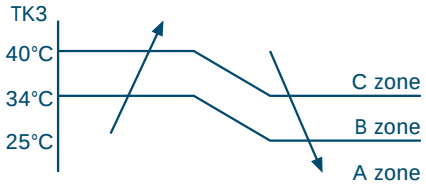
Item	Operation explanation and applied data, etc.	Remarks
1a. Electronic expansion valve (PMV) control	(1) PMV A control (PMV x 2) 1) The PMV (pulse motor valve) is controlled between 100 ~ 1000 pulses during the operation. 2) The PMV is fully open during the cooling operation (PMV A1 = 500 pulses, PMV A2 = 500 pulses). 3) During the heating operation, the opening rate is determined by the temperature which the TS/TD sensor detects and the pressure rate which PS detects (Super heat control). 4) The PMV is fully open when the thermostat is off, when the operation is switched off or when the operation is ceased under abnormal circumstances. 	
1b. Pulse motor valve (PMV) control	(1) PMV B control The purpose of PMV B control is to control the liquid refrigerant bypass by limiting discharge temperature or compressor internal temperature increase. 1) Opening is controlled with pulses from 0 ~ 500. 2) PMV opening is controlled with temp. detected by TS/TD sensors. 3) PMV openings are fully closed during thermostat-OFF, operation stop, and emergency stop.	
2a. Outdoor fan control	(1) Cooling fan control 1) In a specified time when cooling operation is activated, the master outdoor unit controls the outdoor fan speed (no. of fan driving waves) by Pd pressure. The slave outdoor unit controls the outdoor fan speed with temperature detected by TE sensor.  * PD pressure is maintained between 14.5 ~ 18 kgf/cm²G by the cooling fan control. The no. of waves can be controlled between 0 wave (STOP) to 16 waves (all waves).	

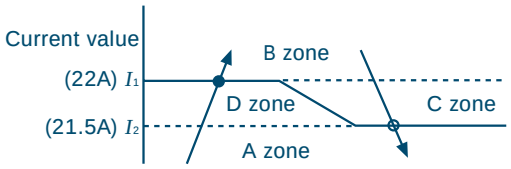
Outdoor Unit

Item	Operation explanation and applied data, etc.	Remarks
2b. Outdoor fan control	(1) Heating fan control 1) The number of waves is controlled according to the TE sensor temperature. 2) If TE > 20°C is constantly detected for 5 minutes, the operation will automatically shut down. This is the same condition as when the thermostat automatically becomes switched off, thus the operation will automatically start again. 3) When the above condition (2) persists and the high pressure SW operates, check the suction area of the indoor unit for blockages. Ensure that the filter is clean and start the operation. 4) After the fan is switched on, this control does not operate during defrost mode. TE temperature (°C) 20: A zone: minimum, compulsory stop timer count 6: B zone: 2/20 seconds (down to the minimum) 4: C zone: 1/20 seconds (down to the minimum) 2: D zone: hold (maintain the current rate) 1: E zone: +1/20 seconds (up to the maximum) F zone: Maximum revolutions number (16) Fixed speed/slave units not operating will maintain the ODU fan at 1 wave to prevent refrigerant from remaining in the ODU Heat Exchanger.	
3. Capacity calculation	By the capacity request command from the indoor controller, the inverter operation command of the master outdoor unit, ON/OFF control of the fixed-speed compressor and the slave outdoor unit are determined. The master outdoor unit sets up activation priority order of the slave outdoor units connected to the system, and starts the operation. **<Example of 30HP system>**  	
4. Oil level valve detection control	1) The volume of oil in the oil tank is judged by the detection temperature of TK1 and TK2 sensors. 2) The present temperature detected by TK1,TK2 and TK3 sensors are stored in memory as the initial value, and then the solenoid valve SV3C is activated. Sampling of TK1,TK2 and TK3 sensor temperature occurs and the temperature change between TK1 and TK2 is judged. If the judgement is such that a reduction in oil is present the oil equalizing control function starts.	

Item	Operation explanation and applied data, etc.	Remarks
5. Oil equalizing control	This control is to prevent oil reduction in the compressor between the outdoor units. This control is classified into two functions, one is an individual control in normal operation which is performed by the master outdoor unit, and the other is a system control which is executed when shortage has been detected in the oil level detection control. This control is executed by open/close operation of solenoid valves SV3A, SV3B, and SV3C, and has the following two patterns. (1) Oil equalizing control 1 This is executed when the master outdoor unit has continuously operated for 30 minutes or more, and the result of the oil level detection judgment has been adequate. If only one outdoor unit is present this control is not implemented. (2) Oil equalizing control 2 This is executed to supply oil collected in the oil tank of each outdoor unit to the outdoor unit of which the oil level has been reduced. When the oil level judgment result of the master outdoor unit has been insufficient while the compressor of master outdoor unit was ON, or when one of the slave outdoor units required oil equalizing, this control is implemented. When only one outdoor unit is present this control is not implemented.	• Controls to divert oil to the inverter unit in operation. • Normal oil equalizing operation.
6. Refrigerant/Oil recovery control	(1) Oil recovery control in cooling mode, Refrigerant recovery control in heating mode During cooling/heating operation, this is executed to recover the oil/refrigerant in gas crossover pipes or indoor units to the outdoor unit when, the compressor operation is reduced, this also prevents stagnation of refrigerant in the outdoor heat exchanger while low ambient cooling operation is performed. This control is managed by the master outdoor unit. 1) Control conditions • When compressor-ON status continued for 60 minutes. • When the cooling thermostat-OFF timer has finished. 2) Contents of control 60 minutes after cooling/heating operation has been activated, the cooling/heating indoor oil/refrigerant recovery signal is sent to the indoor controller. The cooling thermostat-ON 60 minutes timer starts counting again. At the same time, the indoor PMV minimum opening signal is also sent to the indoor controller.	• Recovery time: Approx. 2 min to 6 min though it differs according to the system capacity.

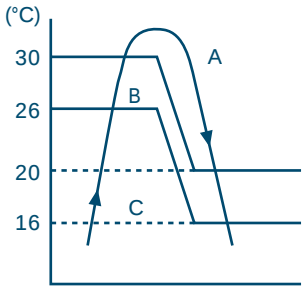
<table>
<tr><th>Item</th><th>Operation explanation and applied data, etc.</th><th>Remarks</th></tr>
<tr><td>7. Release valve control</td><td>
(1) SV2 gas balance control
This control is executed to balance the gas by opening SV2 while the compressor is off, in order to decrease the activation load in the next compressor-ON time. This control is individually executed by the master outdoor unit and each slave outdoor unit.
1) Control conditions
When the compressor is switched from ON to OFF operation.
2) Contents of control
• The control point is exchanged by △P (Pd pressure - Ps pressure) immediately before the compressor stops.
• When △P≥P1, SV2 is opened. After SV2 has been opened, SV2 is turned off when △P<P2.
• When △P<P1, SV2 is closed.
<Table 7a> kgf/cm²G
<table>
<tr><td rowspan="3">Pd pressure control point P1, P2</td><td colspan="4">Cooling</td></tr>
<tr><td colspan="2">Master outdoor compressor OFF</td><td colspan="2">Master outdoor compressor ON</td></tr>
<tr><td>P1</td><td>P2</td><td>P1</td><td>P2</td></tr>
<tr><td>In case of master</td><td>13</td><td>11</td><td>—</td><td>—</td></tr>
<tr><td>In case of slave</td><td>13</td><td>11</td><td>5</td><td>4</td></tr>
</table>
(2) SV2 low pressure release control
This control is to prevent pressure drop during transient operation. This control is individually executed by the master outdoor unit and each slave outdoor unit. This control is executed as necessary except during stop time and thermostat-OFF time.
1) Contents of control
• SV2 is opened when Ps pressure > 0.8 kgf/cm²G
• SV2 is closed when Ps pressure >1.2 kgf/cm²G
(3) SV2 compressor case bypass control
This control is to prevent oil dilution. This control is individually executed by the master outdoor unit and each slave outdoor unit.
This control is executed during compressor-ON (except during oil level detection control).
1) Contents of control
SV2 is opened when the following conditions are satisfied.
• Compressor status changes from OFF to ON.
• Oil recovery control is performed in cooling mode.
• SV2 is opened when TK3 sensor detects 2°C or lower, and closed when TK3 sensor detects 5°C or higher temperature during compressor-ON time.
• No. of outdoor fan waves is 3 waves or less during cooling compressor-ON.
</td><td></td></tr>
<tr><td>8. Fixed-speed compressor high pressure release control</td><td>
This control is to stop the fixed-speed compressor of each outdoor unit according to Pd pressure value. This control is individually executed by the master outdoor unit and each slave outdoor unit.
1) Contents of control
• The fixed-speed compressor stops when Pd pressure is over P1 (Table 7a).
• Sets the fixed-speed compressor reactivation time for 10 minutes, and the control finishes.
</td><td>
• No. 2 compressor stops with Pd≥, P1 = 26.5 kgf/cm²G
• No. 1 compressor stops with Pd≥, P1 = 27.5 kgf/cm²G
</td></tr>
</table>

Item	Operation explanation and applied data, etc.	Remarks
9. Compressor winding heating control	This control is to prevent stagnation of refrigerant in the compressor case by a supply of current to heat the windings while the inverter compressor is off. This control is executed by the inverter outdoor unit only. If the supply of current is not turned on for a specified time before trial operation, when installation work has finished, a fault of the compressor may occur. If the power source is interrupted for a period of time it is necessary to switch power to the system for a minimum of 24 hours before commencing system operation (1) Control conditions Compressor stops and TD < 35°C. (2) Contents of control This control is executed by temperature detected by TK3 sensor as shown in the following figure. **NOTE:** Switching may be heard during heat winding operation, but it is not an error/fault.  A zone: Continuous switch-on power B zone: Intermittent switch-on power ON: 10 minutes OFF: 5 minutes C zone: No switch-on power	
10. Crank case heater control	This control is executed by the fixed-speed unit only. (1) Control contents • This control is switched off when TK3 sensor detected 40°C or higher temperature, and switched on when TK3 sensor detected 35°C or lower temperature. • After the compressor status changed from OFF to ON, ON status continues for 10 minutes.	

Item	Operation explanation and applied data, etc.	Remarks
11. IPDU (Inverter) control	IPDU controls the inverter compressor by command frequency, frequency up/down speed, and current release control value from the interface P.C. board. The main controls of IPDU control P.C. board are described below. (1) Current release control The output frequency is controlled by AC input current value which is detected by T02 on the control P.C. board, to prevent the inverter input current dropping lower than the specified value.  A zone : The normal operation is executed. D zone : The present operation frequency is kept. B zone : The operation frequency is decreased. C zone : Decrease of the operation frequency stopped, and the present operation frequency is kept. (2) Heat sink temp. detection control 1) The heat sink temp. is detected by the thermistor in the compressor driving module Q200, and the inverter compressor driver stops when 120°C is detected. 2) When the inverter compressor driver stops, 1 is counted to the error count. If the error count reaches 3 the system generates a fault code and system operation stops. **NOTE:** When the error has been determined, the ambient outdoor temp. or an outdoor fan error is considered. (3) Over-current protective control 1) The compressor stops when T03 on IPDU control P.C. board detects over-current. 2) When the compressor stops, 1 is counted to the error count, and the compressor reactivates after 2 minutes 30 seconds. After reactivation, the error count is cleared if the operation continues for 10 minutes or more. (4) High pressure SW control 1) The compressor driver stops when the inverter compressor high pressure SW operates. 2) When the compressor driver stops, 1 is counted to the error count, and the compressor driver reactivates after 2 minutes 30 seconds. After reactivation, the error count is cleared if the operation continues for 10 minutes or more.	

Outdoor Units

Item	Operation explanation and applied data, etc.	Remarks
12. Defrost control (reverse defrost method)	(1) Conditions for starting the defrost operation 1) Calculate the operation time when the TE sensor detects below – 1°C during heat mode. When the compressor is activated, start defrost after 25 minutes for the first time and after 55 minutes for the second time and thereafter. (2) How the controlling system works 1) For the master outdoor units The control operates the inverters at the minimum frequency. When the inverter ODU frequency is set minimum, a defrosting signal is sent to the slave outdoor units. The 4-way valves and the outdoor fans go off one after another. The maximum frequency of the inverter ODU is 90Hz. 2) For the slave outdoor units • When the conditions for the defrost operation are all satisfied, a defrost signal is sent to the master outdoor units. • Once the signal is received, the 4-way valves go off and then the outdoor fan goes off. • While the defrost control is in progress, the compressors are all switched on. (3) Conditions for finishing the defrost operation 1) Common condition Once a certain period of time passed after the 4-way valves were off, the control finishes the defrost operation according to the TE sensor detected temperature and the Pd pressure. Defrost will be compulsorily ceased 10 minutes after it was activated. 2) For the master outdoor units Once the above common condition is satisfied and the slave outdoor units have finished sending the defrost signal, the whole defrost operation is . . . complete. 3) Slave outdoor units • When the condition for completing the defrost operation is satisfied, they finish sending the defrost signal to the master outdoor units. • When the condition for completing the defrost operation is satisfied and they finish receiving the signal to stop defrost from the master outdoor units, the defrost operation is complete. (4) Control of completion of the defrost operation 1) For the master outdoor units The control sets the outdoor fans with the maximum frequency 5 minutes after the 4-way valves are switched on. The controller controls the heating fans thereafter. 2) For the master outdoor units • The inverter ODU is operated at the minimum frequency. If the compressors are off, they will be activated and if they are already on, they will be held constant. If a slave outdoor unit is connected, a signal to end the defrost operation will be sent. • The control then switches on the 4-way valves and completes sending the defrost signal to the indoor units.	• If the conditions are satisfied, all the outdoor units should start defrost mode simultaneously. • When the outdoor units are combined, the defrost operation is compulsorily completed for at least 2 minutes. • If the conditions are satisfied, all the outdoor units should finish defrost mode simultaneously.

Item	Operation explanation and applied data, etc.	Remarks
12. Defrost control (reverse defrost method)	3) For the slave outdoor units • The compressors 1 and 2 are kept on. Should they be off they will be switched on. • After the signal to finish the defrost operation is received from the master outdoor units, the 4-way valves become switched on. • The capacity of the compressors is controlled according to the on/off signals from the master outdoor units thereon. (5) SV41, 42 low-pressure release control This prevents the low-pressure level relaxing during the defrost control operation. The master outdoor units and slave outdoor units have their own control over this action when the defrost/heating operation is in progress. 1) Control details When PS pressure ≤ 0.5 kgf/cm²G, the control switches SV41 and SV42 on. When PS pressure ≥ 1.0 kgf/cm²G, SV41, and 42 are switched off.	
13. Cold draught prevention control	(1) During the heating operation, the indoor fan is controlled according to the temperature that is detected by TC2 (indoor heat exchange sensor).  A zone: set fan operation from the remote controller B zone: low fan speed C zone: OFF	• "Preheat defrost" light displayed
14. IDU exchanger heat removal	(1) To prevent the IDU heat exchanger remaining hot after operation has stopped the indoor fan operates in low fan speed for approximately 30 seconds.	

Other cautions

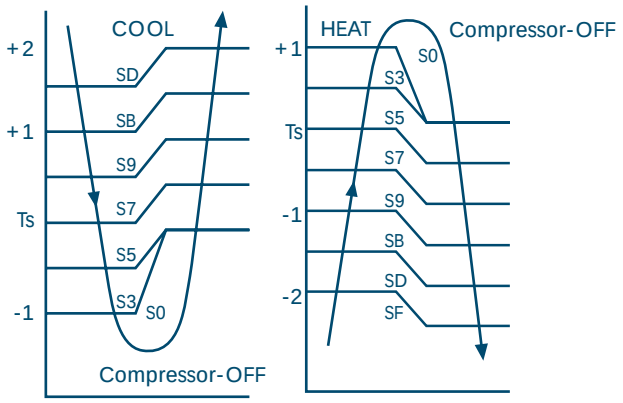
(1) Cooling operation in low ambient temperature

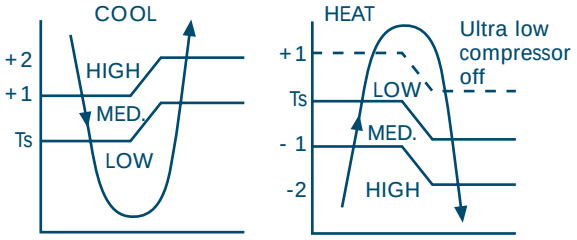
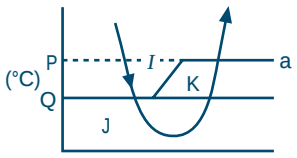
1) When low pressure is reduced, the freeze prevention control by the indoor unit TC sensor may decrease the frequency.
2) When low pressure is reduced, the cooling capacity control may decrease the frequency.
3) When discharge temp. sensor value reduces below 60°C, the frequency may be increased over the receive command from the indoor unit.
4) No. of electro-waves of the outdoor fan decreases, and a low continuous sound may be heard when power is turned on. (This sound is not abnormal.)

(2) PMV (Pulse Motor Valve)

1) When the power is turned on, a tap sound to initialize PMV is heard. If this sound is not heard, PMV operation error may be present. However, this sound may not be heard at a place where outside noise takes prominence.
2) Do not remove the driving part (Head part) of PMV during operation.
3) When replacing a PMV set, never operate the unit with the “head” part removed.
4) When removing the driving part and attaching it again, push in it securely until a “click” sound can be heard. Then, turn the power off, and turn on again.

Indoor Units

Item	Operation explanation and applied data, etc.	Remarks
1. Power source is reset	(1) Automatic remote controller function setup Based upon the result of selecting indoor unit model, setup and display range of the remote controller.	• Operation mode range Air volume select/ Louver presence
2. Operation select	(1) Based upon the operation select command from the remote controller or central controller, the operation mode is selected. **Remote controller command** / **Control outline** STOP — Stops air conditioner FAN — Fan operation COOL — Cooling operation HEAT — Heating operation	
3. Room temp. control	(1) Adjustment range **In cooling/heating** Remote controller setup temp. — 18 to 29°C Operation temp. — 18 to 29°C (2) Operation point with compressor-OFF (3) Operation temp. precision ± 1°C (4) Differential 1°C	
4. Automatic capacity control	(1) Based upon difference between Ta and Ts, the operation frequency is indicated to the outdoor unit.  **NOTE:** The operation frequency in the above zone differs according to horse power or protective control of the outdoor unit.	• Ts : setup temp (R/C). TA: Room temp (Ambient).
5. Capacity correction control	(1) Frequency correction control Frequency of the outdoor unit is corrected so that the present capacity reaches to the certain specified capacity. (2) PMV opening correction control PMV opening is corrected so that the refrigerant status of the indoor unit becomes most appropriate to the demand.	

Item	Operation explanation and applied data, etc.	Remarks
6. Air volume control	(1) By the command from the remote controller or the central controller, “HIGH”, “MED.”, “LOW”, or “AUTO” operation is permissible. (2) While air volume is in AUTO mode, the air volume is changed according to the difference between Ta and Ts. 	• During stop operation, control to prevent cold draft is determined by TC2.
7. Freeze prevention control (Low temp. release)	(1) In cooling operation, the air conditioner operates as described below based upon temp. detected by TC1 and TC2 sensors. • When “J” zone is detected for 2 minutes, the command frequency becomes “S0” to the outdoor unit. • In “K” zone, the timer count is interrupted, and held. • When “I” zone is detected, the timer is cleared and the operation returns to normal operation. • When the command frequency becomes S0 with continuation of “J” zone, operation of the indoor fan in LOW mode occurs until it reaches the “I” zone. It is reset when the following conditions are satisfied. 1) TC1≥10°C and TC2≥10°C 2) 30 minutes after the air conditioner has stopped.  | | TC1 | TC2 | | P | 5 | -12 | | Q | -4 | -15 |	
8. Cooling refrigerant/ Heating oil recovery control	When the indoor units stand by, thermostat is OFF, or unit operates with “FAN” mode, PMV of the indoor unit is opened by a certain degree when the cooling oil/heating refrigerant recovery signal is received from the outdoor unit.	• Only for 4-way/2-way ceiling cassette type, operate the indoor fan intermittently during the recovery operation.
9. Short intermittent operation compensation control	(1) For 5 minutes after the operation has started, the operation is continued even if entering thermostat-OFF condition. (2) However, if the thermostat has been turned off by changing the setup temp., the thermostat is OFF with even the above condition. The protective control has priority.	
10. Drain pump control	(1) During “COOL” operation, the drain pump operates. (2) When the float SW operates, the compressor stops and the drain pump operates. (3) When the operation of the float SW continues for 2 minutes, a check code is generated.	• When CHECK code “0b” occurs, the outdoor units stop and “STANDBY” is displayed on the remote controllers of all the indoor units.

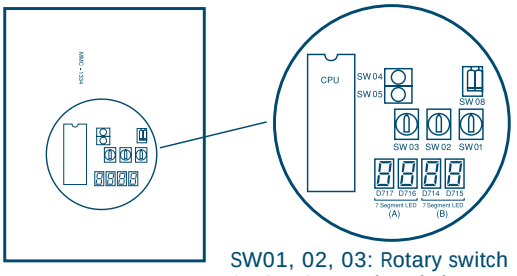
Indoor Units

Item	Operation explanation and applied data, etc.	Remarks
11. Auto louver control	(1) When the louver signal has been received from the remote controller or the central controller, the auto turn louver operates if the indoor fan is operating.	
12. Frequency fix operation (Trial operation)	(1) When holding the START/STOP SW on the remote controller continuously for 5 seconds, the mode changes to Trial operation mode. Then, set the indoor fan to “HIGH” mode to operate the frequency fix.	• Command frequency COOL [SD] “COOL L” • HEAT [SF] “HEAT H”
13. Filter sign display	(1) The operation time of the indoor fan is measured and stored in memory, and it is displayed on the remote controller LCD after the specified time (120H/2500H). Selection of 120H/2500H is factory set. (2) When the filter reset signal has been received from the remote controller, the measured time is reset and LCD display is cleared.	• “FILTER” is displayed • Selection of J11 presence
14. STANDBY display	(1) When phase order of the power source wiring is incorrect. • Over capacity combination of indoor units. • There is an indoor unit with the indoor overflow alarm “0b”. (2) The above indoor unit status that cannot operate enters standby status when the thermostat is turned off, and this status continues until STANDBY status is released.	• “STANDBY” is displayed
15. Central controller selection	(1) The functions which can be operated on the indoor unit remote controller can also be selected on the central controller. **[Last-push priority]:** Can be operated from both the indoor unit remote controller and the central controller, and operates with the content as per last selection. **[Central]:** START/STOP and the timer operation can be selected by the IDU remote controller. **[Operation forbidden]:** Cannot be operated on the indoor unit remote controller (as STOP status).	• (No display) • “CENTRAL” is displayed • “CENTRAL” flashes

Outdoor Units

System information data display (Displayed on the inverter unit only)

The combination of rotary switches SW01, SW02 and SW03 display the following info:



SW01, 02, 03: Rotary switch
SW04, 05: Push switch
SW08: Dip switch

SW03	SW02	SW01		Displayed content			
3	1	1	Use refrigerant	Type of refrigerant used is displayed.		A	B
				• In case of R22 model		22	
				• In case of R407C model		40	7C
	2		Outdoor system capacity	A	8] to [46]: 8 to 46HP		
				B	[HP]		
	3		No. of connected outdoor units	A	[1] to [5]: 1 to 5 units		
				B	[P]		
	4		No. of connected indoor units	A	[0] to [40]: 0 to 40 units		
				B	[P]		
	5		No. of operating indoor units	A	[0] to [40]: 0 to 40 units		
				B	[P]		
	6		—	A	—		
				B			
	7		Release control operation	A	[r]: Normal operation, [r1]: Under release control		
				B	—		
	8		Oil equalizing pattern	A	[OL]		
				B	[P]: Normal operation, [P1] to [P3]: Oil equalizing patterns 1 to 3A		
	9		—	A	—		
				B	—		
	10		Refrigerant/Oil recovery operation	A	[C-]: Normal operation, [C1]: Under cooling oil recovery control		
				B	[H-]: Normal operation, [H1]: Under heating refrigerant recovery		
	11		Automatic address	A	[Ad]		
				B	[ ]: In normal time (Automatic address setup completes) [11]: Under automatic address setup		
	12		—	—			
	13		—	—			
	14		—	—			
	15		—	—			
	16		—	—			

Outdoor unit information data display (Displayed on each outdoor unit)

SW03	SW02	SW01		Displayed content			
1	1	1	Check code	A	[U1] to [U5]: Outdoor unit number (1: Inverter)		
				B	[– –]: Normal time (No error), a check code is displayed in abnormality.		
				<SW04> Push function: Only fan of unit in which an error occurred operates. <SW04 + SW05> Push function: Only fan of normal unit operates. <SW05> Push function: Fan operation function is interrupted.			
	2		Type of installed compressor	A	[U1] to [U2]: Outdoor unit number		
				B	[A]: Fixed-speed 2 in 1, [b]: Fixed-speed 2 compressor [C]: Fixed-speed single, [d]: Inverter (2 in 1)		
	3		Operation mode	A	—		
				B	[C]: Cooling operation, [H]: Heating operation		
	4		Outdoor unit capacity	A	[6], [8], [10]: 6, 8, 10HP		
				B	[HP]		
	5		Compressor operation command	A	[1. –]: No.1 compressor stop status, [1. 1]: During operation For inverter, the frequency code is displayed: [00] to [FF]		
				B	[2. –]: No.2 compressor stop status, [2. 1]: During operation		
				<SW04> Push function: Inverter frequency data is displayed in decimal notation. <SW05> Push function: Release of frequency data display in decimal notation			
	6		Outdoor fan operation pattern	A	[FP]		
				B	[0] to [16]: 0 wave (stop) to 16 waves (All waves)		
	7		Compressor backup	A	[C1]: Under No.1 compressor backup setup		
				B	[C2]: Under No.2 compressor backup setup		
	8		—	A	—		
				B	—		
	9		Control valve output			A	B
				SV2: OFF		H. O	2. 0
				SV2: ON		H. O	2. 1
	10			SV3A: ON/SV3B: OFF/SV3C: OFF		3. 1	0 0
				SV3A: OFF/SV3B: ON/SV3C: OFF		3. 0	1 0
				SV3A: OFF/SV3B: OFF/SV3C: ON		3. 0	0 1
	11			SV41: ON/SV42: OFF		4. 0	1 0
				SV41: OFF/SV42: ON		4. 0	0 1
	12			—		—	—
	13			—		—	—
	14		PMV A1 + PMV A2 opening	[00] to [500]: 0 to 1000 pulse		0	0 P
	15		PMVB opening	[00] to [500]: 0 to 500 pulse		0	0 P
	16		Oil level judgment status	A	[OL]		
				B	[ ]: Initial display, [FF]: Oil judgment start status [A0]: Adequate, [A1]: Shortage, [A2 to A4]: Detection error		
				<SW04> Push function: Oil level judgment control forcible start (Detection starts after timer count down) <SW05> Push function: Oil level shortage status/Continuous counter display (Displayed for several seconds)			

NOTE: The push-switch function operates by input from the inverter unit.

(3) Outdoor cycle data display (Displayed on each outdoor unit)

SW03	SW02	SW01		Displayed content			
2	1	1	Pd pressure sensor	Pressure sensor data is displayed with (MPaG).		A	B
						H ★	★ ★
	2		Ps pressure sensor			L ★	★ ★
	3		TD1 temp. sensor	Temp. sensor data is displayed with (°C). • Symbol display and data display are alternately exchanged every several seconds. • Data is displayed in the part marked with [★]. • If data is negative data, [– ★ ★ ★] is displayed.	Symbol	t d	1
					Data	★	★ ★
	4		TD2 temp. sensor		Symbol	t d	2
					Data	★	★ ★
	5		TS temp. sensor		Symbol	t s	
					Data	★ ★	★
	6		TE1 temp. sensor		Symbol	t E	1
					Data	★	★ ★
	–		–		–	–	–
					–	–	–
	8		TK1 temp. sensor		Symbol	t F	1
					Data	★ ★	★
	9		TK2 temp. sensor		Symbol	t F	2
					Data	★ ★	★
	10		TK3 temp. sensor		Symbol	t F	3
					Data	★ ★	★

(4) Outdoor cycle data display (Displayed on each outdoor unit)

* Outdoor cycle data display is used when the fixed-speed unit information is displayed on the 7 segment section of the inverter unit.

SW03	SW02	SW01		Displayed content	
1 to 4	1	3	Check code	A	[U2] to [U5]: Outdoor unit number (Setup with SW03)
				B	[– –]: Normal time (No error), a check code is displayed in abnormality.
	2		Type of fixed-speed compressor	A	[U2] to [U5]: Outdoor unit number (Setup with SW03)
				B	A]: Fixed-speed 2 in 1 compressor [b]: Fixed-speed 2 compressor [C]: Fixed-speed single compressor
	3		Fixed-speed unit capacity	A	[U2] to [U5]: Outdoor unit number (Setup with SW03)
				B	[6], [8], [10]: 6, 8, 10HP
	4		Fixed-speed compressor operation command	A	[6], [8], [10]: 6, 8, 10HP
				B	[10]: No.1 compressor start/No.2 compressor stop status [01]: No.1 compressor stop/No.2 compressor start status
	5		—	A	[U2] to [U5]: Outdoor unit number (Setup with SW03) For inverter, the frequency code is displayed: [00] to [FF]
				B	—
	6		—	A	[U2] to [U5]: Outdoor unit number (Setup with SW03)
				B	—
	7		Oil level judgment status	A	[U2] to [U5]: Outdoor unit number (Setup with SW03)
				B	[ ]: Normal time, [L]: Shortage

NOTE: The outdoor unit number is set by selecting SW03.

SW03	Outdoor unit number	7 segment display A
1	Outdoor No.2 unit (Fixed-speed 1)	[U2]
2	Outdoor No.3 unit (Fixed-speed 2)	[U3]
3	Outdoor No.4 unit (Fixed-speed 3)	[U4]
4	Outdoor No.5 unit (Fixed-speed 4)	[U5]

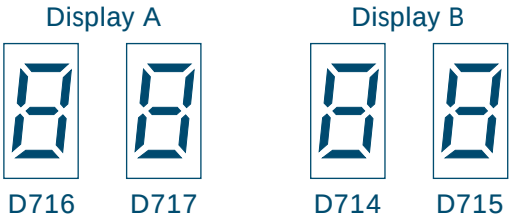
(5) Outdoor unit information data display (Displayed on inverter unit only)

SW03	SW02	SW01		Displayed content	
1 to 3	1 to 16	4	Indoor communication/ Receive status	A	[01] to [48]: Indoor address number
				B	[1]: Receiving, [– –]: No connection
		5	Indoor check code	A	[01] to [48]: Indoor address number
				B	[– –]: No error, a check code is displayed when an error occurs.
		6	Indoor horse power	A	A [01] to [48]: Indoor address number
				B	Corresponded HP is displayed. ([– –]: No connection) [0, 8], [1], [1, 2], [1, 5], [1, 7], [2] [2, 5], [3], [3, 2], [4], [5]
		7	Indoor demand command (S code)	A	[01] to [48]: Indoor address number
				B	[0]: In STOP time, [3] to [F]: During operation (S3 to SF)
		8	Indoor PMV opening	A	[01] to [48]: Indoor address number
				B	Data is displayed as pulse
		9	Indoor saturation temp.	A	[01] to [48]: Indoor address number
				B	Data is displayed as temperature
		10	Indoor TA sensor	A	[01] to [48]: Indoor address number
				B	Data is displayed as temperature
		11	Indoor TC2 sensor	A	[01] to [48]: Indoor address number
				B	Data is displayed as temperature
		12	Indoor TC1 sensor	A	[01] to [48]: Indoor address number
				B	Data is displayed as temperature

NOTE: The indoor address number is set by selecting SW02 or SW03.

SW03	SW02	Outdoor unit number	7 segment display A
1	1 to 16	SW02 setup number	[01] to [16]
2	1 to 16	SW02 setup number + 16	[17] to [32]
3	1 to 16	SW02 setup number + 32	[33] to [48]

- 7 segment display A, B



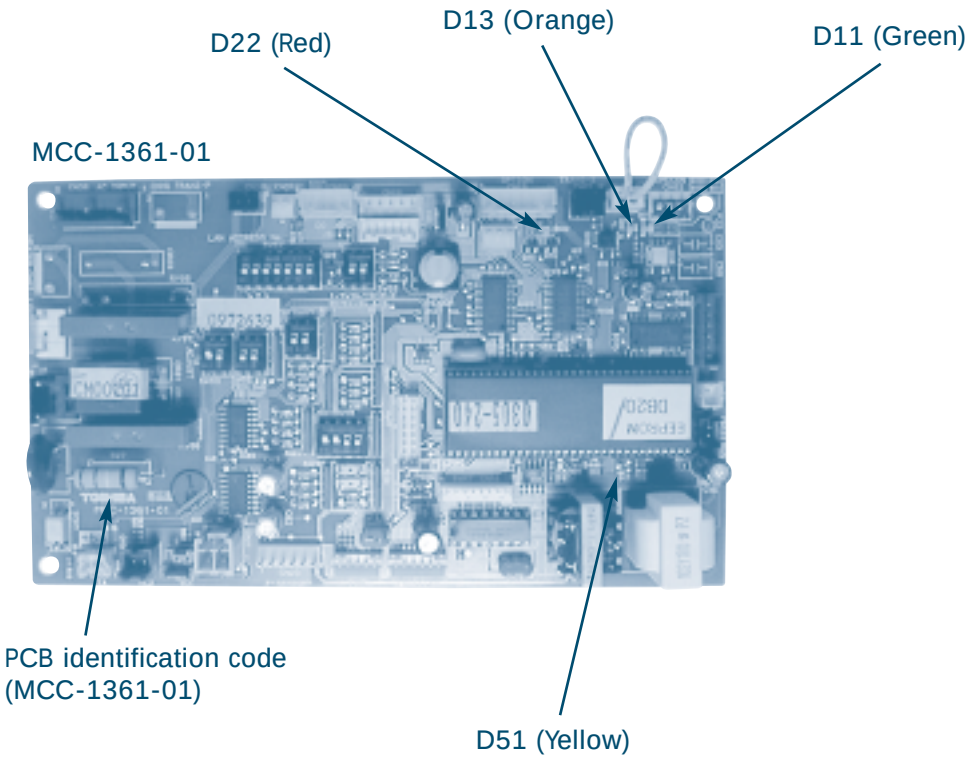
Indoor Units

(1) LED display on indoor P.C. board – MCC-1361-01

General type

Part No.	Colour	Displayed content	Details
D13	Orange	Serial receive	Flashes synchronized with the receive signal to the standard remote controller.
D11	Green	Serial send	Flashes synchronized with the send signal from the standard remote controller.
D22	Red	Alarm stop display	Goes on when the indoor unit stops with fault.
D51	Yellow	Cycle communication	Flashes synchronized with receive signal from the outdoor unit.

Indoor P.C. board parts layout



(2) Display on remote controller

In the following conditions, “STANDBY” is displayed on the remote controller.

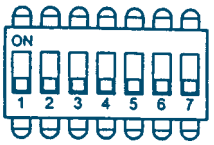
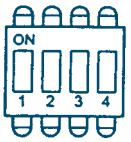
1) “STANDBY” display
Fan operation is available, but PMV of the indoor unit is not permissible. (Refrigerant does not flow.)
a. Indoor unit over capacity
When the total HP of the connected indoor units exceeds 1.35 times of outdoor HP, the indoor unit will display “STANDBY” mode.
The check code “89” is displayed at the same time when “STANDBY” is displayed.
b. Outdoor unit phase order error
If phase order of power source of the outdoor unit is different, the indoor unit will display “STANDBY” mode.
The check code “AF” is displayed at the same time as “STANDBY”.
c. Indoor operation below 0.8HP control
When the total capacity of the operating indoor units is below 0.8HP, the relevant indoor unit displays “STANDBY” mode. A check code is not displayed.
Incorrect setup of indoor HP is confirmed. Recheck setup of SW08.

(3) Indoor PMV full open/full close function

PMV used in the indoor unit can be forcibly opened fully, closed fully, and opened in medium degree for 2 minutes.

CN33	CN32	PMV Opening
Open	Open	Normal operation
Open	Short	Fully open
Short	Open	Fully closed
Short	Short	Medium opening (Half open)

(4) Switch positions at shipment from the factory

SW No.	Function	Description	Position at shipment from factory
SW01	Indoor unit No.	Group operation control setup setup1: Master unit 2 to 16 Slave units	
SW02	Network address setup	No.7 ON: Address setup by remote controller is unavailable. No.7 OFF: Address setup by remote controller is available. For contents of address setup, see the next page.	
SW03	TA adjust	No. 1 ON: Normal No. 2 OFF: Normal	
SW06	Ceiling height	No. 1 OFF: Normal No. 2 OFF: Normal When height of ceiling exceeds 2.7m set No. 1 to ON.	
SW07	Central control switching	No.1 ON: Communication error (Non relay) No.1 OFF: (Normal) Communication OK No. 2 OFF: Normal	
SW08	Indoor HP setup	Factory set For contents of switch setup, see section (5)	

(5) Contents of switch setup

Network address setup table by DIP switch (SW02)

- After turning off the power source, set 7 of DIP switch (SW02) to ON. Address setup from the remote controller becomes unavailable.

Address No.	DIP switch (SW02)					
	1	2	3	4	5	6
1	X	X	X	X	X	X
2	O	X	X	X	X	X
3	X	O	X	X	X	X
4	O	O	X	X	X	X
5	X	X	O	X	X	X
6	O	X	O	X	X	X
7	X	O	O	X	X	X
8	O	O	O	X	X	X
9	X	X	X	O	X	X
10	O	X	X	O	X	X
11	X	O	X	O	X	X
12	O	O	X	O	X	X
13	X	X	O	O	X	X
14	O	X	O	O	X	X
15	X	O	O	O	X	X
16	O	O	O	O	X	X
17	X	X	X	X	O	X
18	O	X	X	X	O	X
19	X	O	X	X	O	X
20	O	O	X	X	O	X
21	X	X	O	X	O	X
22	O	X	O	X	O	X
23	X	O	O	X	O	X
24	O	O	O	X	O	X
25	X	X	X	O	O	X
26	O	X	X	O	O	X
27	X	O	X	O	O	X
28	O	O	X	O	O	X
29	X	X	O	O	O	X
30	O	X	O	O	O	X
31	X	O	O	O	O	X
32	O	O	O	O	O	X

Address No.	DIP switch (SW02)					
	1	2	3	4	5	6
33	X	X	X	X	X	O
34	O	X	X	X	X	O
35	X	O	X	X	X	O
36	O	O	X	X	X	O
37	X	X	O	X	X	O
38	O	X	O	X	X	O
39	X	O	O	X	X	O
40	O	O	O	X	X	O
41	X	X	X	O	X	O
42	O	X	X	O	X	O
43	X	O	X	O	X	O
44	O	O	X	O	X	O
45	X	X	O	O	X	O
46	O	X	O	O	X	O
47	X	O	O	O	X	O
48	O	O	O	O	X	O
49	X	X	X	X	O	O
50	O	X	X	X	O	O
51	X	O	X	X	O	O
52	O	O	X	X	O	O
53	X	X	O	X	O	O
54	O	X	O	X	O	O
55	X	O	O	X	O	O
56	O	O	O	X	O	O
57	X	X	X	O	O	O
58	O	X	X	O	O	O
59	X	O	X	O	O	O
60	O	O	X	O	O	O
61	X	X	O	O	O	O
62	O	X	O	O	O	O
63	X	O	O	O	O	O
64	O	O	O	O	O	O

SW08				Selected content
1	2	3	4	
X	X	O	X	Indoor capacity 0.8 HP
X	X	O	O	Indoor capacity 1.0 HP
X	O	X	X	Indoor capacity 1.25 HP
X	O	X	O	Indoor capacity 1.5 HP
X	O	O	X	Indoor capacity 1.7 HP
X	O	O	O	Indoor capacity 2.0 HP
O	X	X	X	Indoor capacity 2.5 HP
O	X	X	O	Indoor capacity 3.0 HP
O	X	O	X	Indoor capacity 3.2 HP
O	X	O	O	Indoor capacity 4.0 HP
O	O	X	X	Indoor capacity 5.0 HP

NOTE:
O: ON side X: OFF (Numeral) side

DIP switch table for indoor unit HP set up

(6) Service P.C. board selection corresponded table MCC-1361-01

The indoor control P.C. board can correspond to multiple models. When replacing MCC-1361-01 P.C. board assembly, set DIP switch, rotary switch, and jumper according to the following description.

PCB Label	Model
CM★★C01	MM-U140, MM-U112, MM-U080, MM-U056, MM-TU056, MM-TU042, MM-TU028
CM★★C02	MM-B140, MM-B112, MM-B080, MM-B056, MM-SB028, MM-N080, MM-N056, MM-N042, MM-N028, MM-S080, MM-S056, MM-SR080, MM-SR056
CM★★C03	MM-C/CR140, MM-C/CR112, MM-C/CR080, MM-C/CR056, MM-C/CR042 MM-K/KR140, MM-K/KR112, MM-K/KR080, MM-K/KR056, MM-K/KR042

Switch setup

1 SW01 Indoor unit No. : Match to No. which the rotary switch is setup.
: Master unit 1
: Server units ..... 2 to 16

2 SW02 Network address : Match to setup contents of P.C. board before replacement.

3 SW03 : Match to setup contents of P.C. board before replacement.

4 SW06 : Match to the setup contents of P.C. board before replacement.
(In some models, it is not available.)

5 SW07 Central Control Switching : Match to the setup contents of P.C. board before replacement.

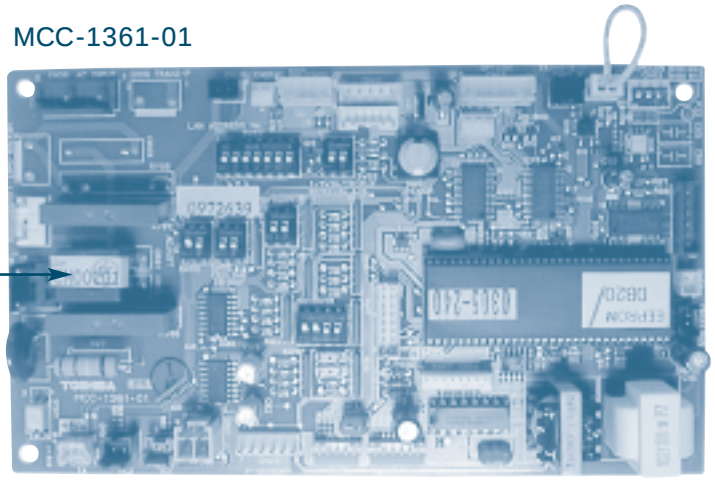
6 SW08 HP setup : Match to the setup contents of P.C. board before replacement.

Jumper setup

Match to the setup contents of P.C. board before replacement.
In some models, the following selections are provided. O: Provided X: None

J11	O	Filter timer 120H
	X	Filter timer 2500H

MCC-1361-01



Remote Controller Check Display

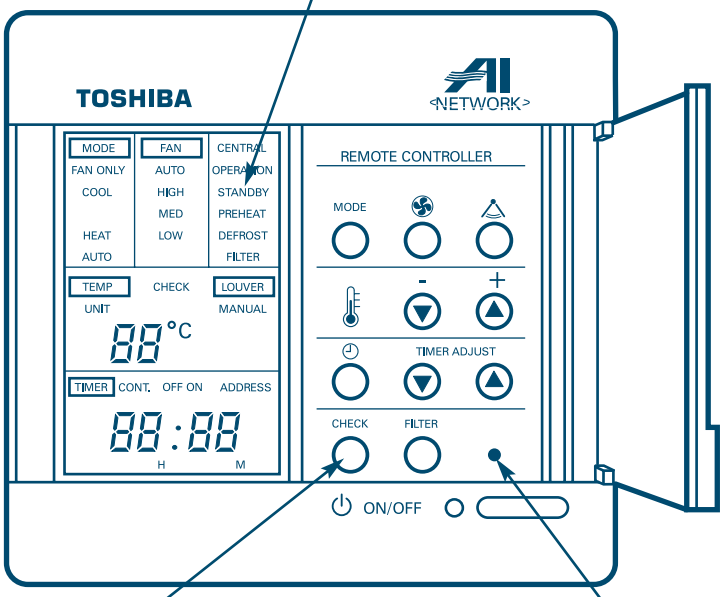
Main Remote Controller

Operating and Reading the Check Display

Push the CHECK button, and the identification number of the faulty indoor unit is shown in the Temperature Setup section of the display – and the check code is shown in the TIME section of the display.
If the air filter cleaning sign is displayed, the number of indoor units with a filter problem is indicated, followed by the check code.

LCD Display

"Standby" Mode:
- When combination of indoor units is over the capacity.
- When indoor unit with command excepted by operation mode select switch.
- When phase-sequence of power wiring is incorrect.



Check Switch
- Push for 0.5 seconds to display CHECK code.
- Push for 3 seconds to reset indoor microprocessor. (While indoor microprocessor is locked by ALL STOP alarm.)
- Push for 10 seconds to clear check data.

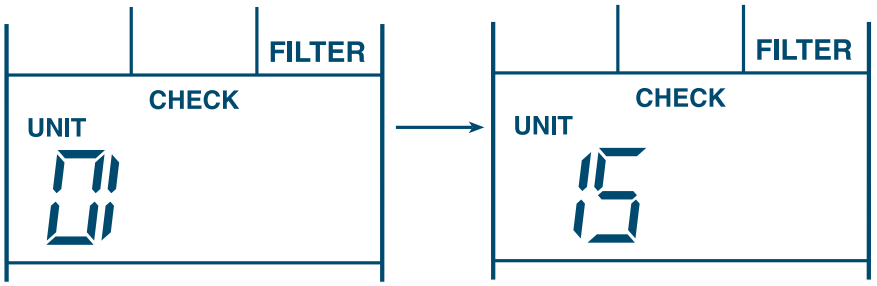
Reset Switch
- Push the switch inside the hole with pin. The remote controller resets initialised. (All data is cleared.)

Remote Controller Check Display

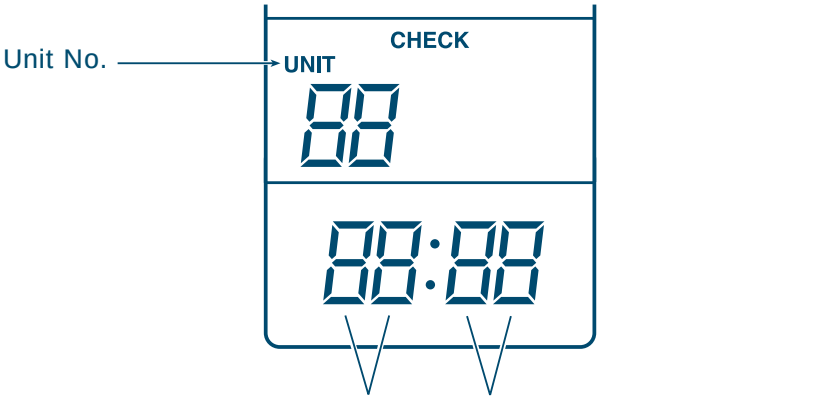
7-Segment Display

Filter Data

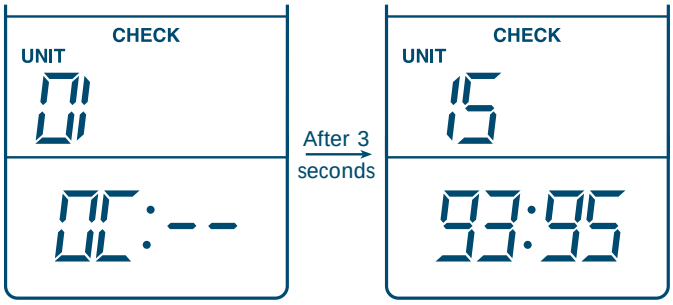
Example: A Filter signal is sent from No. 1 and No. 15 units under grouping operation.



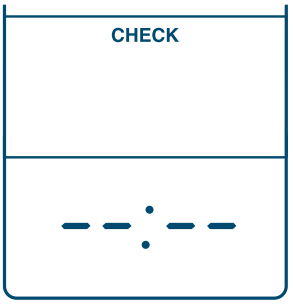
Check Data



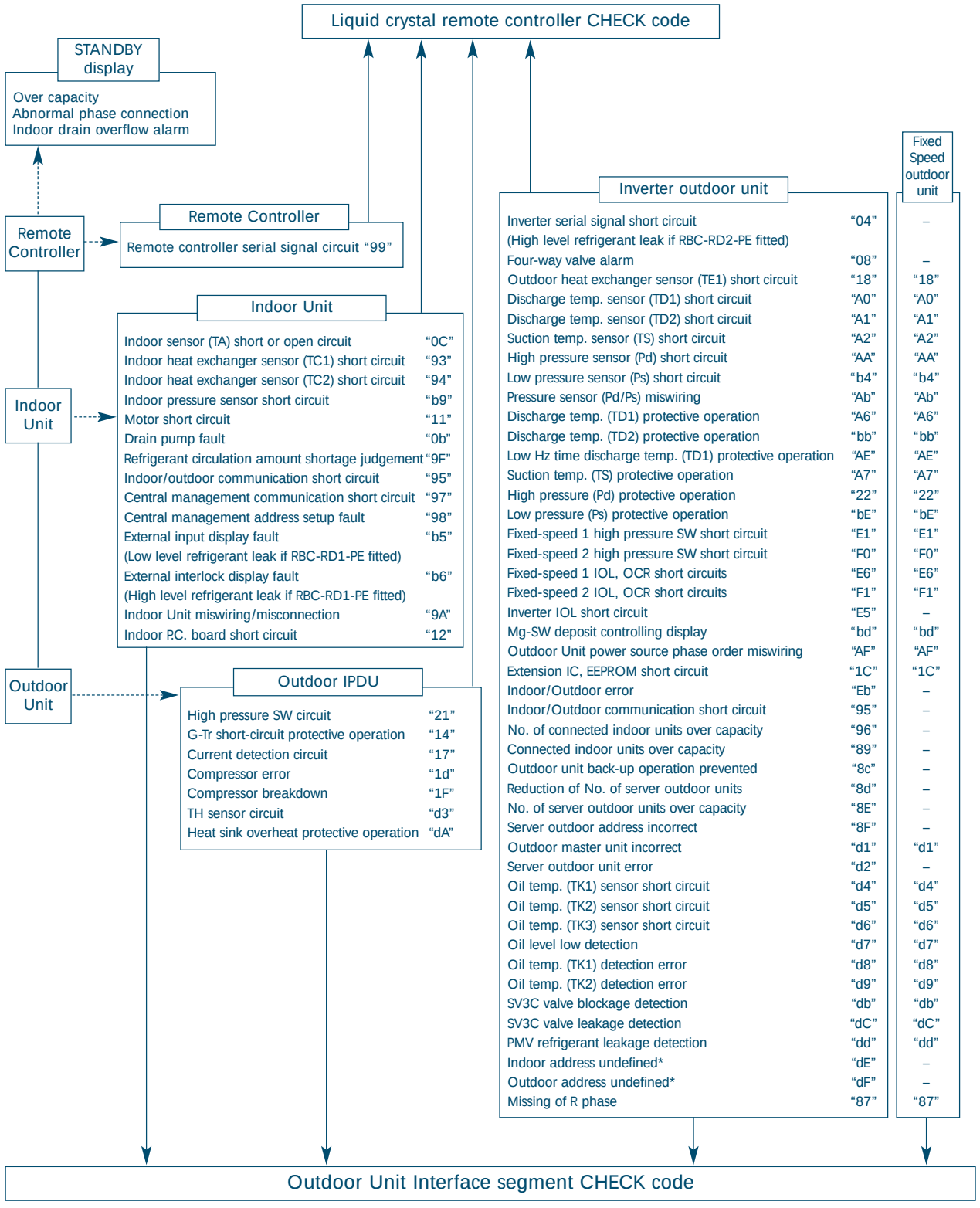
Example: Room Temp. sensor of No. 1 is defective. In No. 15, first the Heat Exchanger sensor has failed. Next, the indoor/outdoor inter-unit wire (bus communication line) is defective.



Example: There is no check data.



Self Diagnostic Function

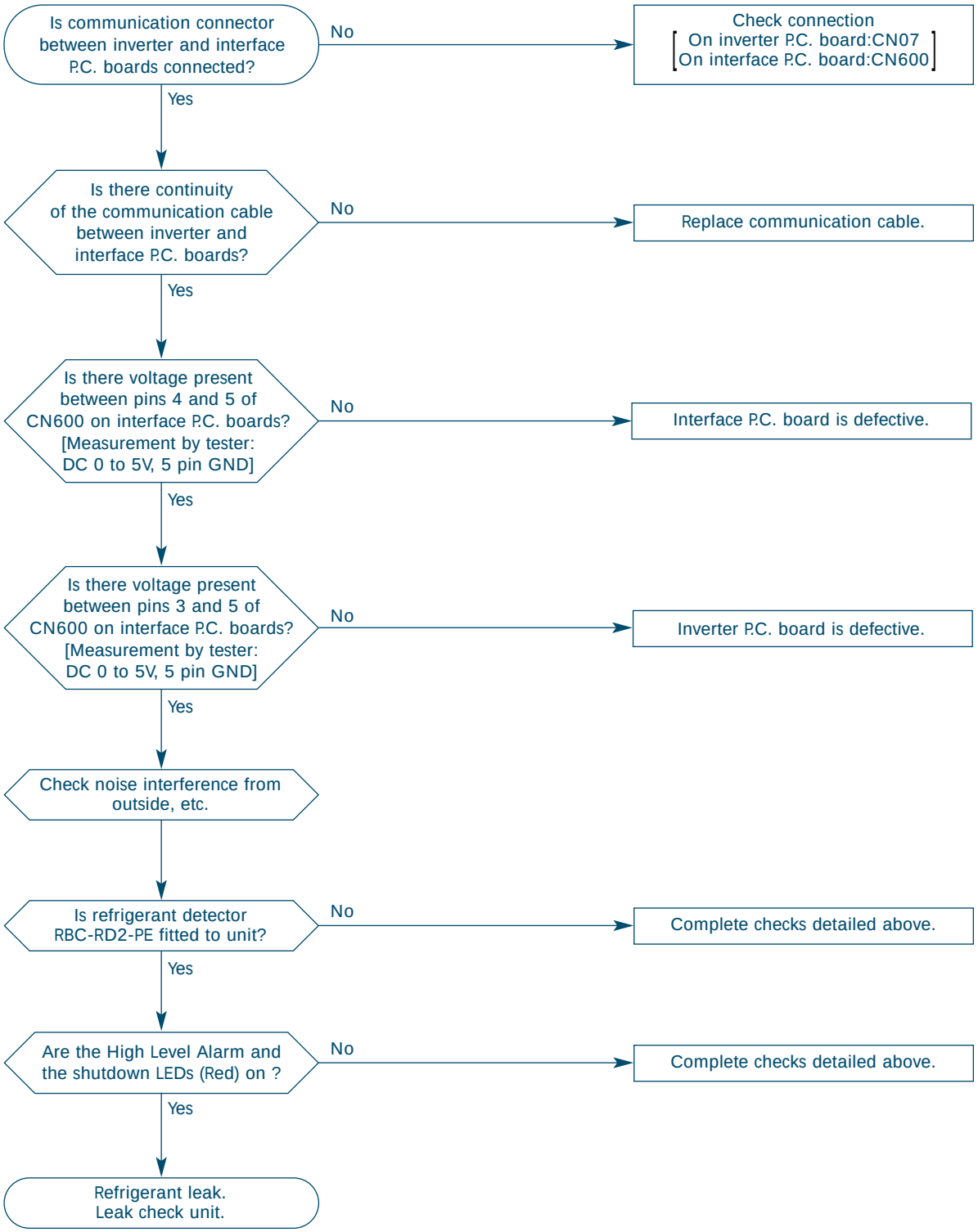

Liquid crystal remote controller CHECK code
STANDBY display
Over capacity
Abnormal phase connection
Indoor drain overflow alarm
Remote Controller
Remote Controller
Remote controller serial signal circuit "99"
Indoor Unit
Indoor Unit
Indoor sensor (TA) short or open circuit "0C"
Indoor heat exchanger sensor (TC1) short circuit "93"
Indoor heat exchanger sensor (TC2) short circuit "94"
Indoor pressure sensor short circuit "b9"
Motor short circuit "11"
Drain pump fault "0b"
Refrigerant circulation amount shortage judgement "9F"
Indoor/outdoor communication short circuit "95"
Central management communication short circuit "97"
Central management address setup fault "98"
External input display fault "b5"
(Low level refrigerant leak if RBC-RD1-PE fitted)
External interlock display fault "b6"
(High level refrigerant leak if RBC-RD1-PE fitted)
Indoor Unit miswiring/misconnection "9A"
Indoor P.C. board short circuit "12"
Outdoor Unit
Outdoor IPDU
High pressure SW circuit "21"
G-Tr short-circuit protective operation "14"
Current detection circuit "17"
Compressor error "1d"
Compressor breakdown "1F"
TH sensor circuit "d3"
Heat sink overheat protective operation "dA"
Inverter outdoor unit
Fixed Speed outdoor unit
Inverter serial signal short circuit "04" –
(High level refrigerant leak if RBC-RD2-PE fitted)
Four-way valve alarm "08" –
Outdoor heat exchanger sensor (TE1) short circuit "18" "18"
Discharge temp. sensor (TD1) short circuit "A0" "A0"
Discharge temp. sensor (TD2) short circuit "A1" "A1"
Suction temp. sensor (TS) short circuit "A2" "A2"
High pressure sensor (Pd) short circuit "AA" "AA"
Low pressure sensor (Ps) short circuit "b4" "b4"
Pressure sensor (Pd/Ps) miswiring "Ab" "Ab"
Discharge temp. (TD1) protective operation "A6" "A6"
Discharge temp. (TD2) protective operation "bb" "bb"
Low Hz time discharge temp. (TD1) protective operation "AE" "AE"
Suction temp. (TS) protective operation "A7" "A7"
High pressure (Pd) protective operation "22" "22"
Low pressure (Ps) protective operation "bE" "bE"
Fixed-speed 1 high pressure SW short circuit "E1" "E1"
Fixed-speed 2 high pressure SW short circuit "F0" "F0"
Fixed-speed 1 IOL, OCR short circuits "E6" "E6"
Fixed-speed 2 IOL, OCR short circuits "F1" "F1"
Inverter IOL short circuit "E5" –
Mg-SW deposit controlling display "bd" "bd"
Outdoor Unit power source phase order miswiring "AF" "AF"
Extension IC, EEPROM short circuit "1C" "1C"
Indoor/Outdoor error "Eb" –
Indoor/Outdoor communication short circuit "95" –
No. of connected indoor units over capacity "96" –
Connected indoor units over capacity "89" –
Outdoor unit back-up operation prevented "8c" –
Reduction of No. of server outdoor units "8d" –
No. of server outdoor units over capacity "8E" –
Server outdoor address incorrect "8F" –
Outdoor master unit incorrect "d1" "d1"
Server outdoor unit error "d2" –
Oil temp. (TK1) sensor short circuit "d4" "d4"
Oil temp. (TK2) sensor short circuit "d5" "d5"
Oil temp. (TK3) sensor short circuit "d6" "d6"
Oil level low detection "d7" "d7"
Oil temp. (TK1) detection error "d8" "d8"
Oil temp. (TK2) detection error "d9" "d9"
SV3C valve blockage detection "db" "db"
SV3C valve leakage detection "dC" "dC"
PMV refrigerant leakage detection "dd" "dd"
Indoor address undefined* "dE" –
Outdoor address undefined* "dF" –
Missing of R phase "87" "87"
Outdoor Unit Interface segment CHECK code

*: No display on the remote controller

Note: To retrieve fault codes, ensure rotary switches 1, 2 and 3 on the Outdoor Interface PCB (MCC-1343-01) are all set to 1 (factory default setting).
Individual Indoor Fault Codes can be retrieved by referring to page 49.

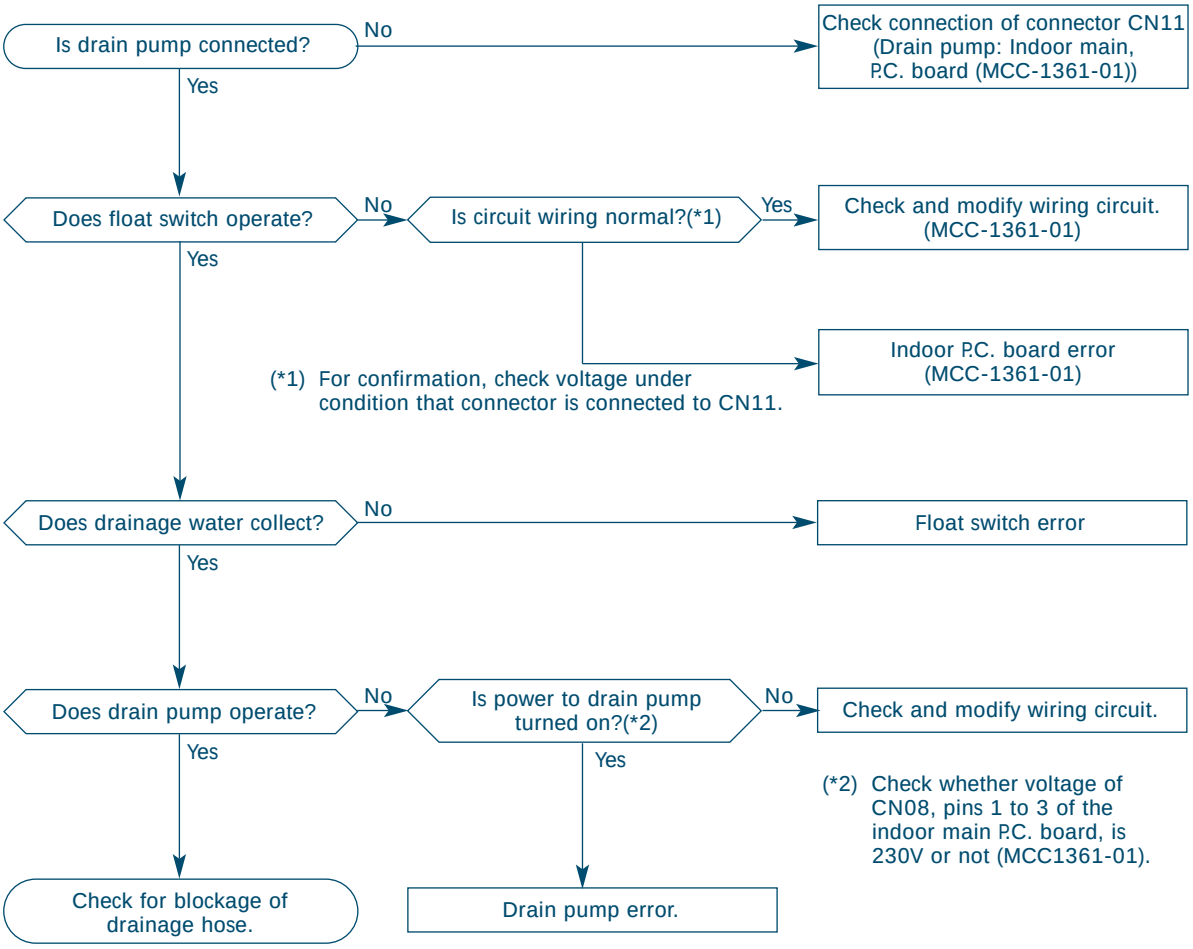
Diagnostic Procedure for Check Code

Check code	Operation cause
[04] Inverter communication alarm	1. Connection error of communication cable between inverter and interface P.C. boards 2. Defective interface P.C. board 3. Defective inverter P.C. board 4. Noise from outside 5. High level refrigerant leak if RBC-RD2-PE fitted.


Is communication connector between inverter and interface P.C. boards connected?
No
Check connection
[On inverter P.C. board:CN07
On interface P.C. board:CN600]
Yes
Is there continuity of the communication cable between inverter and interface P.C. boards?
No
Replace communication cable.
Yes
Is there voltage present between pins 4 and 5 of CN600 on interface P.C. boards? [Measurement by tester: DC 0 to 5V, 5 pin GND]
No
Interface P.C. board is defective.
Yes
Is there voltage present between pins 3 and 5 of CN600 on interface P.C. boards? [Measurement by tester: DC 0 to 5V, 5 pin GND]
No
Inverter P.C. board is defective.
Yes
Check noise interference from outside, etc.
Is refrigerant detector RBC-RD2-PE fitted to unit?
No
Complete checks detailed above.
Yes
Are the High Level Alarm and the shutdown LEDs (Red) on ?
No
Complete checks detailed above.
Yes
Refrigerant leak.
Leak check unit.

Diagnostic Procedure for Check Code

Check code	Operation cause
[0b] Indoor water overflow alarm	1. Float switch disconnection 2. Drain pump operation error 3. Drain hose blockage


Is drain pump connected?
No
Check connection of connector CN11 (Drain pump: Indoor main, P.C. board (MCC-1361-01))
Yes
Does float switch operate?
No
Is circuit wiring normal?(*1)
Yes
Check and modify wiring circuit. (MCC-1361-01)
Yes
Indoor P.C. board error (MCC-1361-01)
(*1) For confirmation, check voltage under condition that connector is connected to CN11.
Does drainage water collect?
No
Float switch error
Yes
Does drain pump operate?
No
Is power to drain pump turned on?(*2)
No
Check and modify wiring circuit.
Yes
Yes
(*2) Check whether voltage of CN08, pins 1 to 3 of the indoor main P.C. board, is 230V or not (MCC1361-01).
Check for blockage of drainage hose.
Drain pump error.

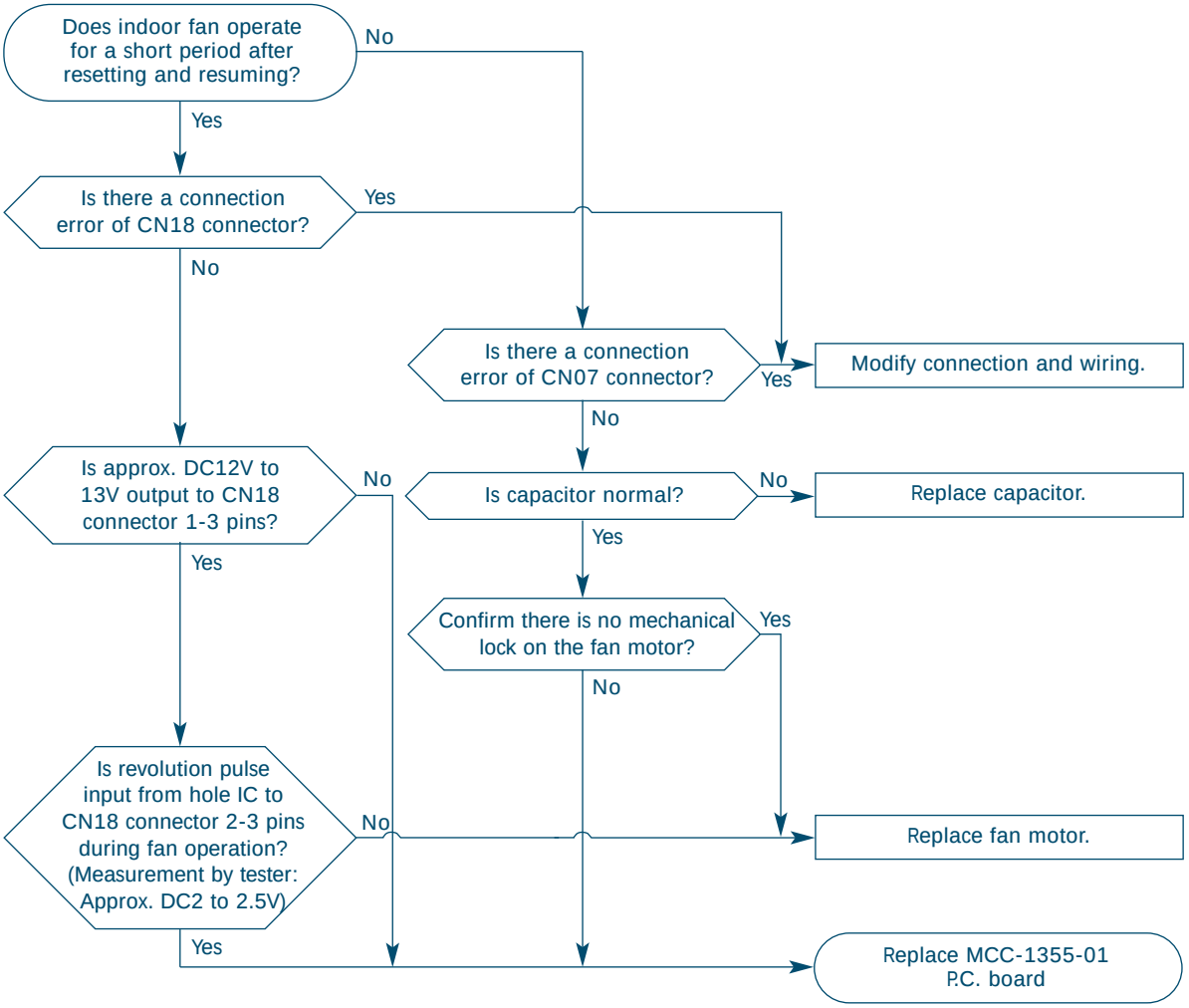
Check code	Operation cause
[0C] Indoor TA sensor alarm	TA sensor open/short

TA sensor open/short has been detected. Check disconnection of connector connection (TA sensor: CN04) circuit and resistance value characteristics of sensor.

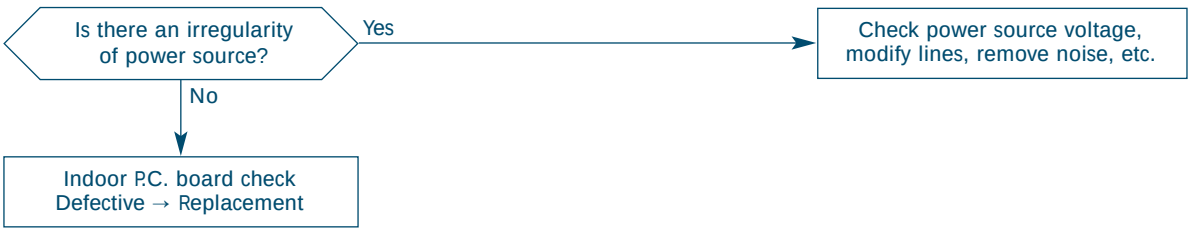
When the sensors are normal, replace indoor P.C. board (MCC-1361-01).

Diagnostic Procedure for Check Code

Check code	Operation cause
[11] **Indoor fan motor alarm**	1. Fan motor circuit connection error 2. Capacitor error 3. Fan motor error 4. Defective indoor P.C. board

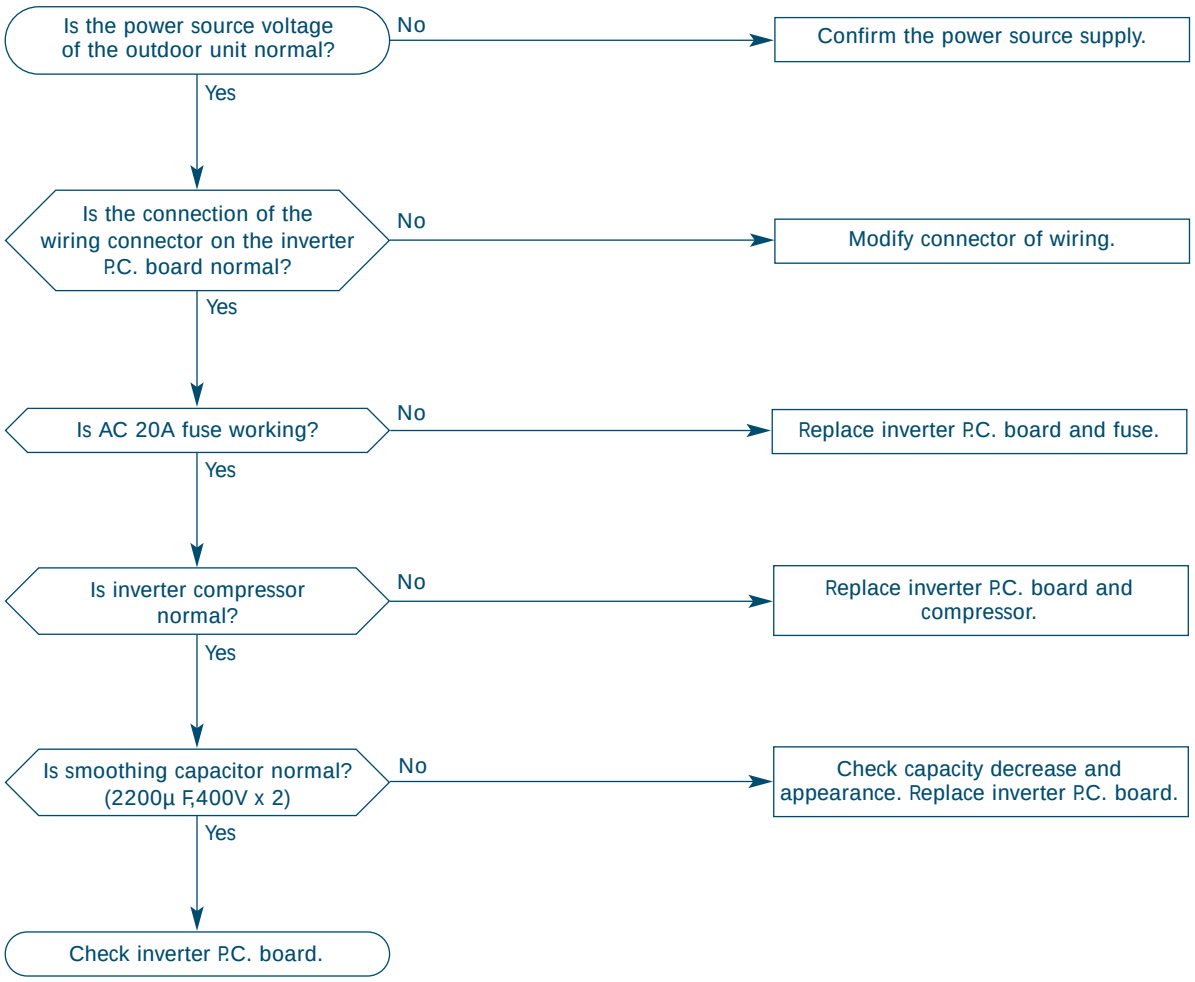

Does indoor fan operate for a short period after resetting and resuming?
No
Yes
Is there a connection error of CN18 connector?
Yes
No
Is there a connection error of CN07 connector?
Yes
Modify connection and wiring.
No
Is approx. DC12V to 13V output to CN18 connector 1-3 pins?
No
Is capacitor normal?
No
Replace capacitor.
Yes
Yes
Confirm there is no mechanical lock on the fan motor?
Yes
No
Is revolution pulse input from hole IC to CN18 connector 2-3 pins during fan operation? (Measurement by tester: Approx. DC2 to 2.5V)
No
Replace fan motor.
Yes
Replace MCC-1355-01 P.C. board

Check code	Operation cause
[12] **Other indoor alarm**	1. Irregularity of power source 2. Noise of peripheral equipment 3. Defective indoor P.C. board


Is there an irregularity of power source?
Yes
Check power source voltage, modify lines, remove noise, etc.
No
Indoor P.C. board check
Defective → Replacement

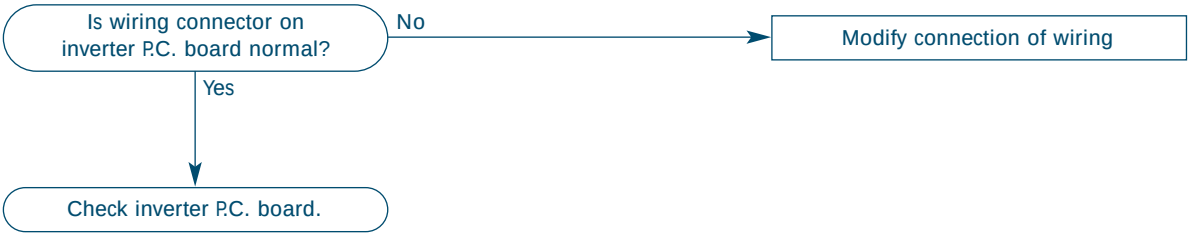
Diagnostic Procedure for Check Code

Check code	Operation cause
[14] G-Tr short circuit protective system alarm (Gate Transistor)	1. Outdoor unit power source error 2. Wiring error on inverter P.C. board 3. AC fuse disconnection 4. Inverter compressor error 5. Defective inverter P.C. board


Is the power source voltage of the outdoor unit normal?
No
Confirm the power source supply.
Yes
Is the connection of the wiring connector on the inverter P.C. board normal?
No
Modify connector of wiring.
Yes
Is AC 20A fuse working?
No
Replace inverter P.C. board and fuse.
Yes
Is inverter compressor normal?
No
Replace inverter P.C. board and compressor.
Yes
Is smoothing capacitor normal? (2200µ F,400V x 2)
No
Check capacity decrease and appearance. Replace inverter P.C. board.
Yes
Check inverter P.C. board.

Diagnostic Procedure for Check Code

Check code	Operation cause
[17] Current detect circuit system alarm	1. Defective wiring of inverter P.C. board 2. Defective inverter P.C. board

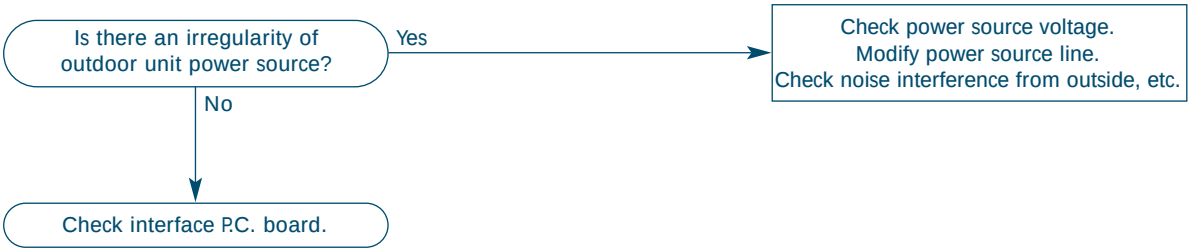


Check code	Operation cause
[18] TE1 sensor open/short	TA sensor open/short

TE1 sensor open/short has been detected. Confirm sensor is not disconnected (TE1 sensor: CN505), confirm circuit and resistance value characteristics of sensor.

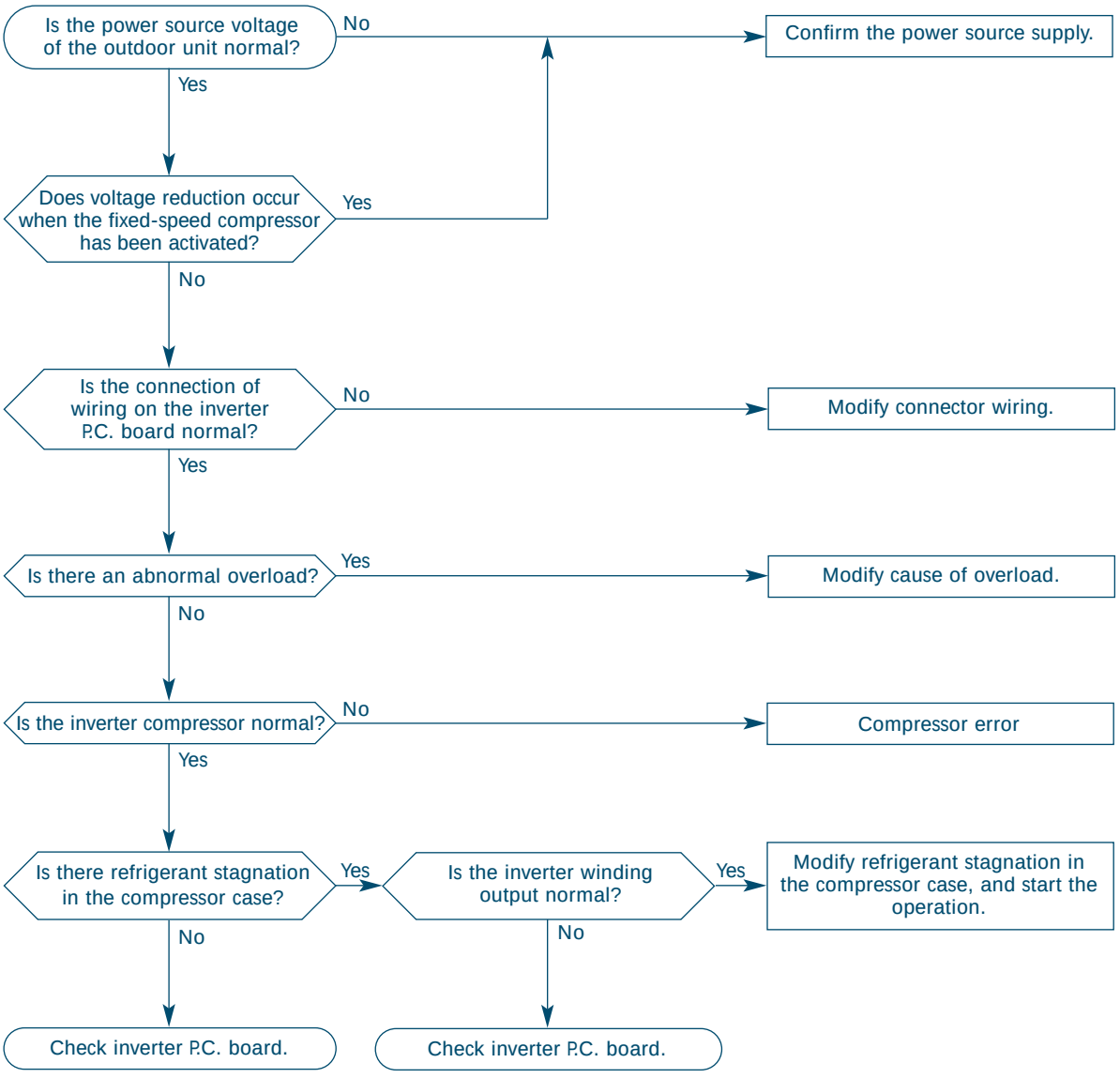
When the sensors are normal, replace outdoor P.C. board.

Check code	Operation cause
[1C] Extension IC, EEPROM alarm	1. Outdoor unit power source error 2. Interface P.C. board error


Is there an irregularity of outdoor unit power source?
Yes
Check power source voltage.
Modify power source line.
Check noise interference from outside, etc.
No
Check interface P.C. board.

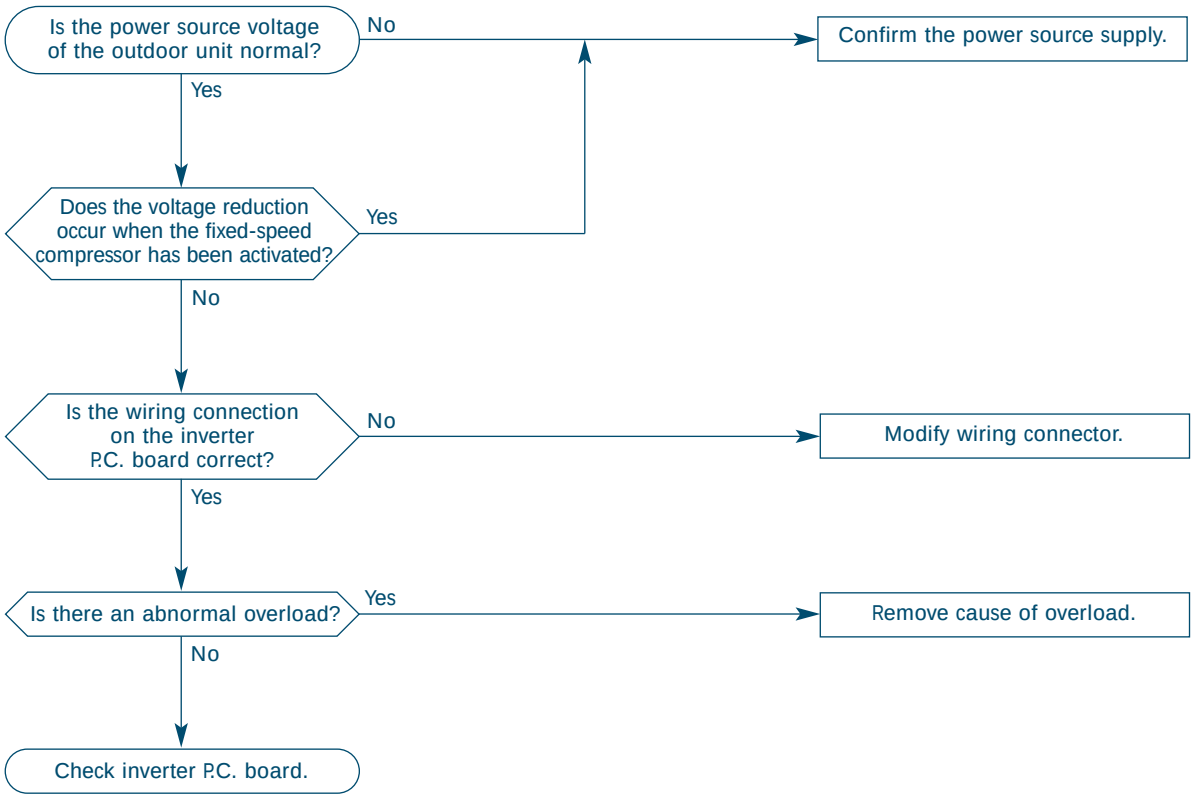
Diagnostic Procedure for Check Code

Check code	Operation cause
[1d] **Compressor alarm**	1. Outdoor unit power source error 2. Inverter compressor circuit system error 3. Inverter compressor error 4. Inverter compressor refrigerant stagnation 5. Defective inverter P.C. board



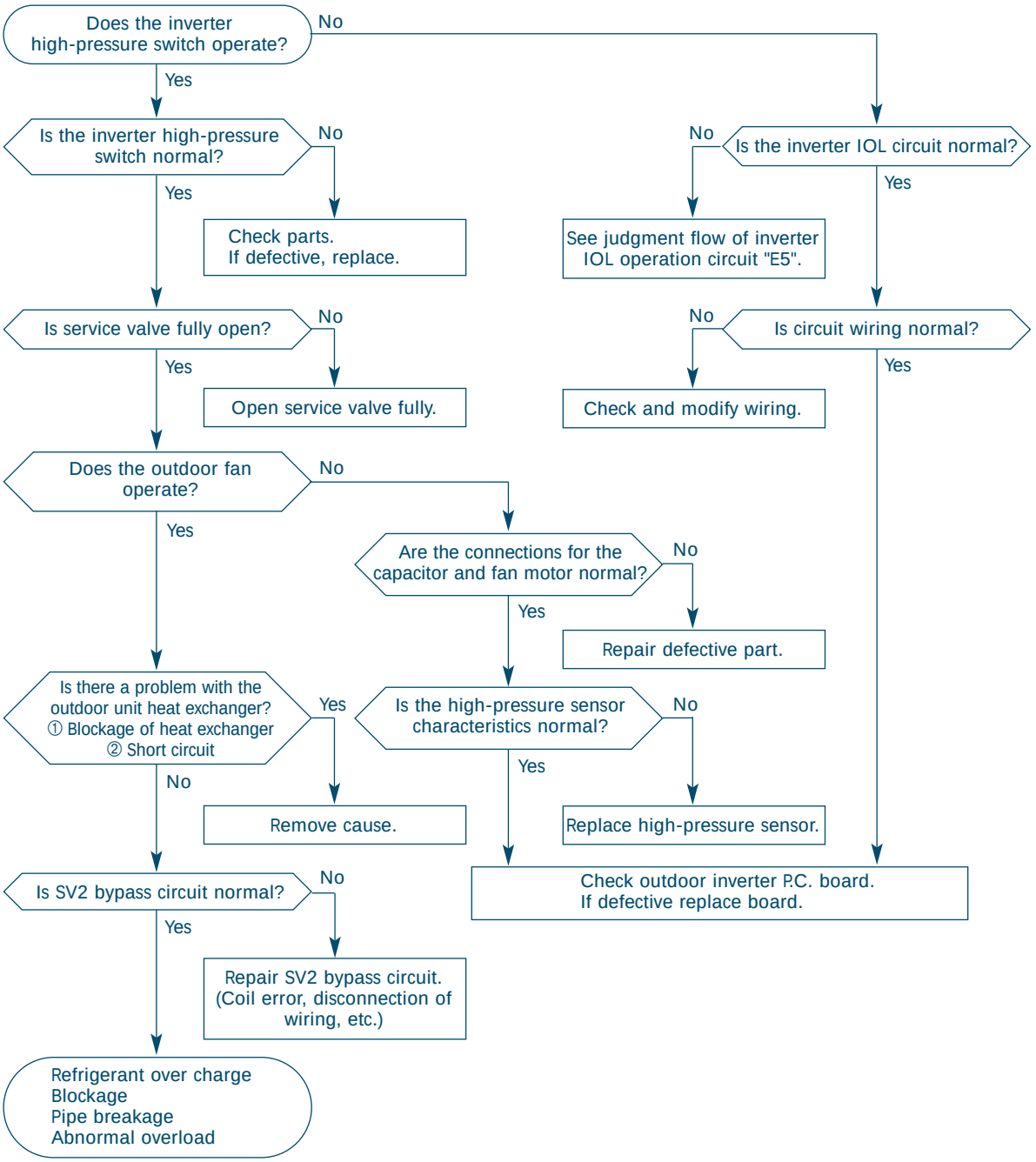
Diagnostic Procedure for Check Code

Check code	Operation cause
[1F] Compressor break down	1. Outdoor unit power source error 2. Inverter compressor circuit system error 3. Inverter P.C. board error



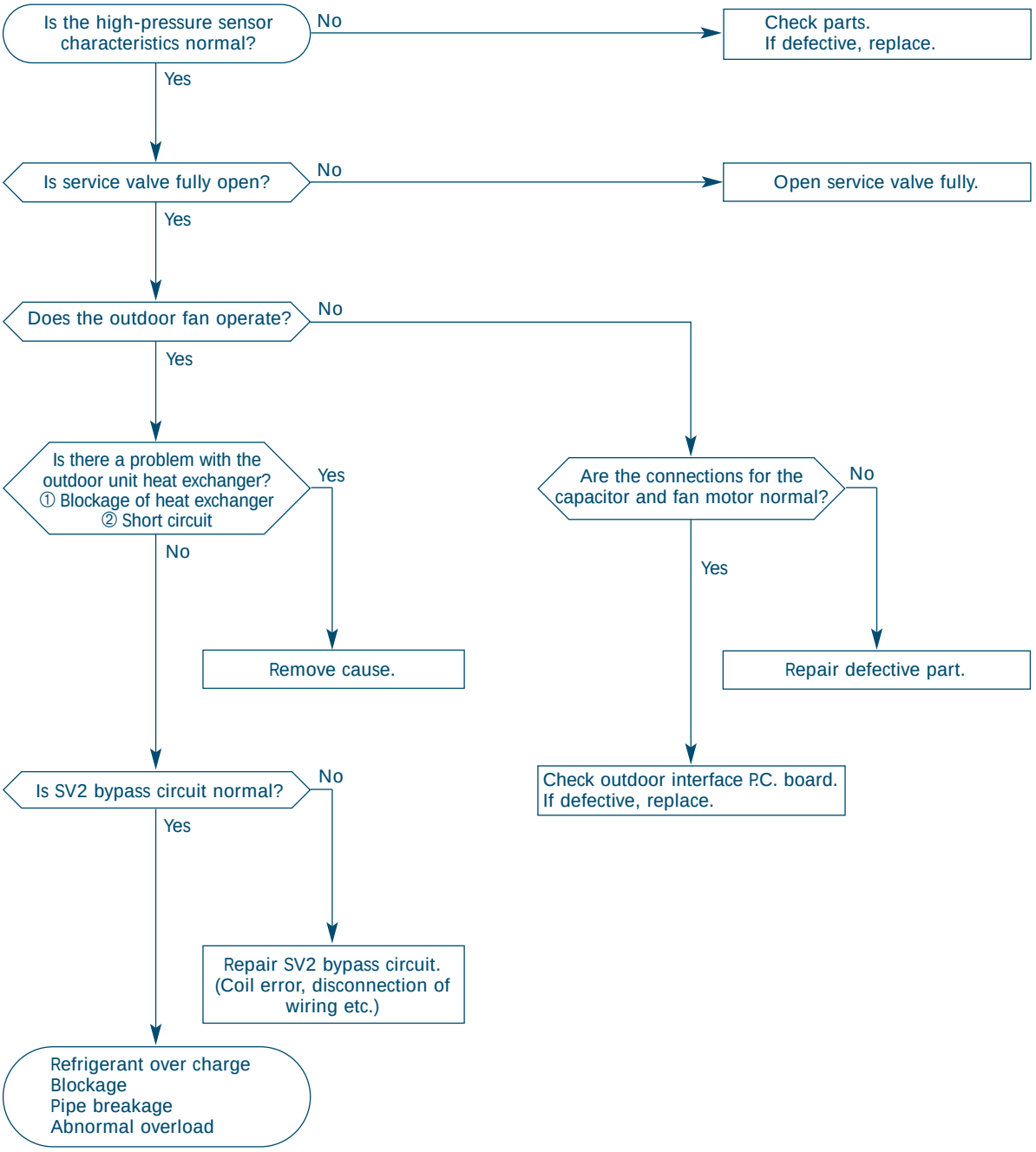
Diagnostic Procedure for Check Code

Check code	Operation cause
[21] Inverter high-pressure SW system alarm	1. Inverter high-pressure SW error 2. Inverter IOL (Inner Overload) operation 3. Service valve closed 4. Outdoor fan, capacitor error 5. Indoor/Outdoor PMV blockage 6. Outdoor heat exchanger blockage 7. SV2 circuit blockage 8. Indoor – Outdoor communication error 9. Pd sensor error 10. Refrigerant over charge



Diagnostic Procedure for Check Code

Check code	Operation cause
[22] High-pressure protective operation	1. Pd sensor error 2. Service valve closed 3. Outdoor fan, capacitor error 4. Indoor/Outdoor PMV blockage 5. Outdoor heat exchanger blockage 6. SV2 circuit blockage 7. Communication error between indoor and outdoor units



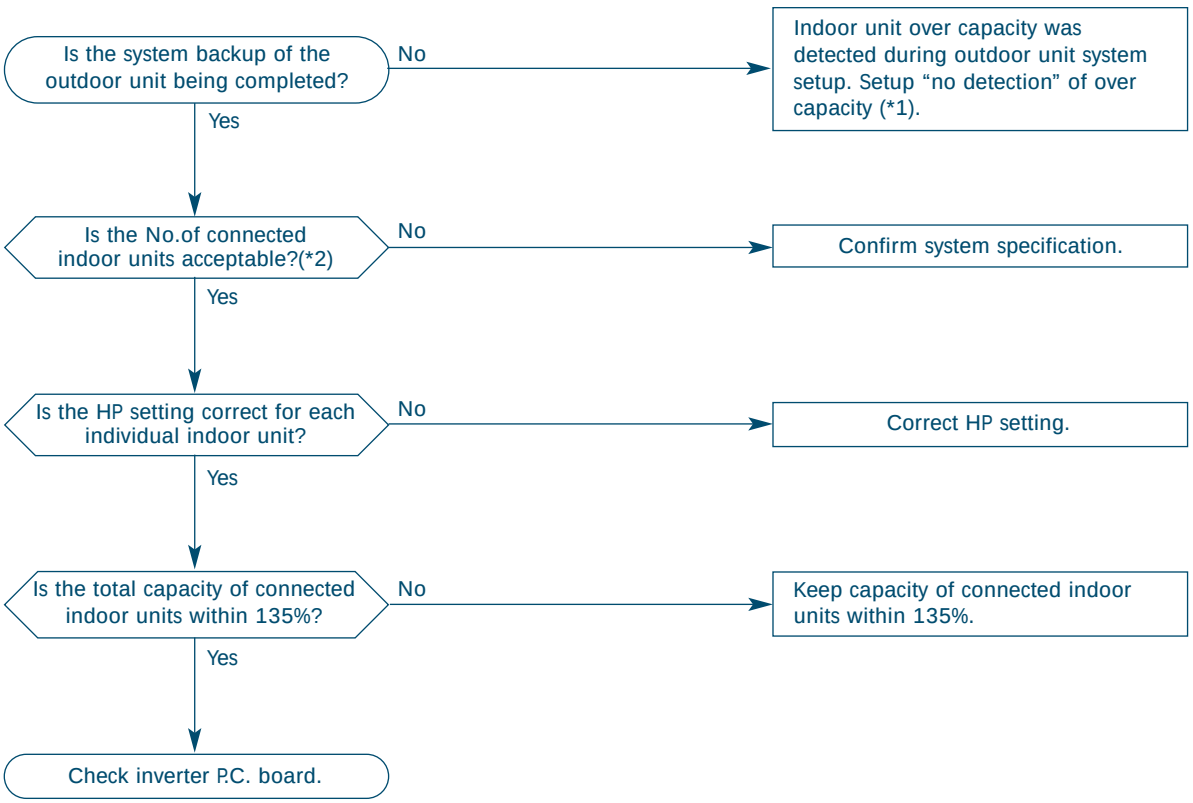
Diagnostic Procedure for Check Code

Check code	Operation cause
[87] Missing phase	Missing phase of outdoor unit power source

A Phase of the outdoor unit power source is missing.

Modify the power source wiring.

Check code	Operation cause
[89] Indoor over capacity	1. No. of connected indoor units/connected over capacity. 2. Incorrect setup of indoor unit HP.

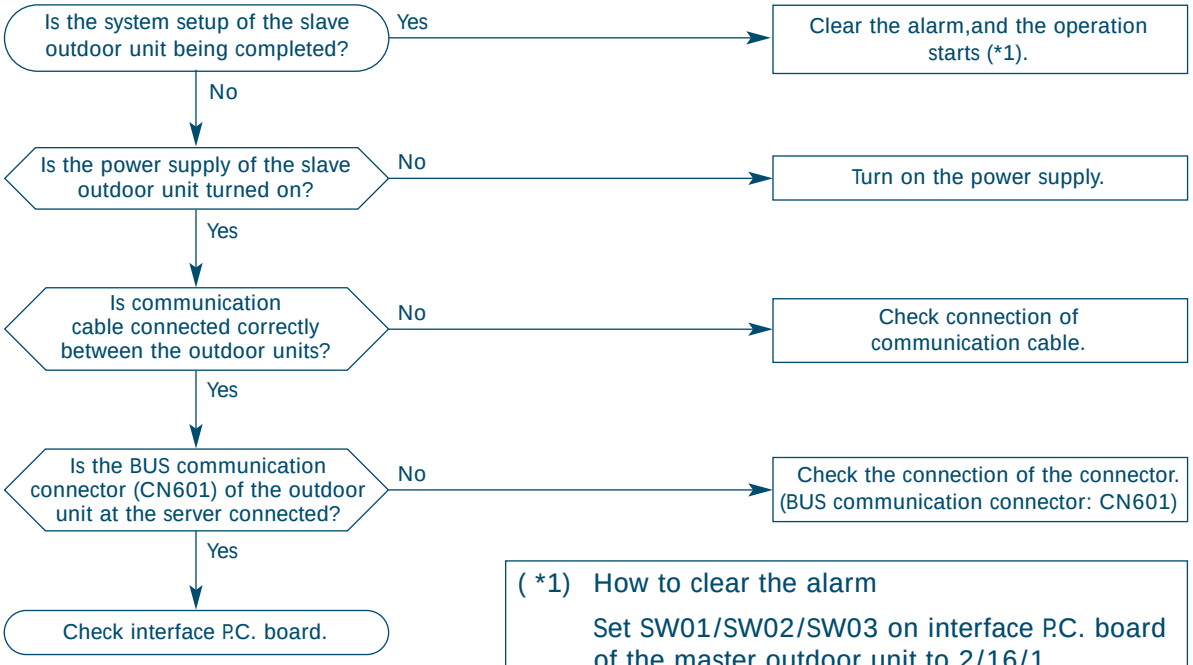

Is the system backup of the outdoor unit being completed?
No
Indoor unit over capacity was detected during outdoor unit system setup. Setup “no detection” of over capacity (*1).
Yes
Is the No.of connected indoor units acceptable?(*2)
No
Confirm system specification.
Yes
Is the HP setting correct for each individual indoor unit?
No
Correct HP setting.
Yes
Is the total capacity of connected indoor units within 135%?
No
Keep capacity of connected indoor units within 135%.
Yes
Check inverter P.C. board.

(*1) Setup “no detection” of over capacity.
Turn on SW09 bit 2 on interface P.C. board of outdoor unit (usually OFF).

(*2) Check No. of connected indoor units.
Set SW01/SW02/SW03 on interface P.C. board of outdoor unit to 1/4/3, respectively.
No. of connected units is displayed on the 7 segment display.

Diagnostic Procedure for Check Code

Check code	Operation cause
[8d] Reduction in the No. of connected outdoor units	1. Outdoor unit system setup 2. Outdoor unit power source 3. Connection error of communication cable between outdoor units 4. Connection error of BUS communication 5. Interface P.C. board error

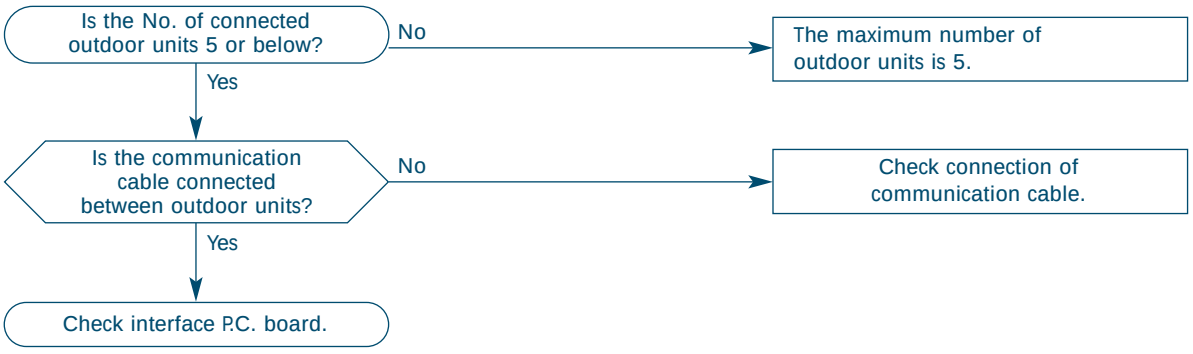

Is the system setup of the slave outdoor unit being completed?
Yes
Clear the alarm,and the operation starts (*1).
No
Is the power supply of the slave outdoor unit turned on?
No
Turn on the power supply.
Yes
Is communication cable connected correctly between the outdoor units?
No
Check connection of communication cable.
Yes
Is the BUS communication connector (CN601) of the outdoor unit at the server connected?
No
Check the connection of the connector. (BUS communication connector: CN601)
Yes
Check interface P.C. board.

(*1) How to clear the alarm

Set SW01/SW02/SW03 on interface P.C. board of the master outdoor unit to 2/16/1 respectively, and push SW04 for 5 seconds.

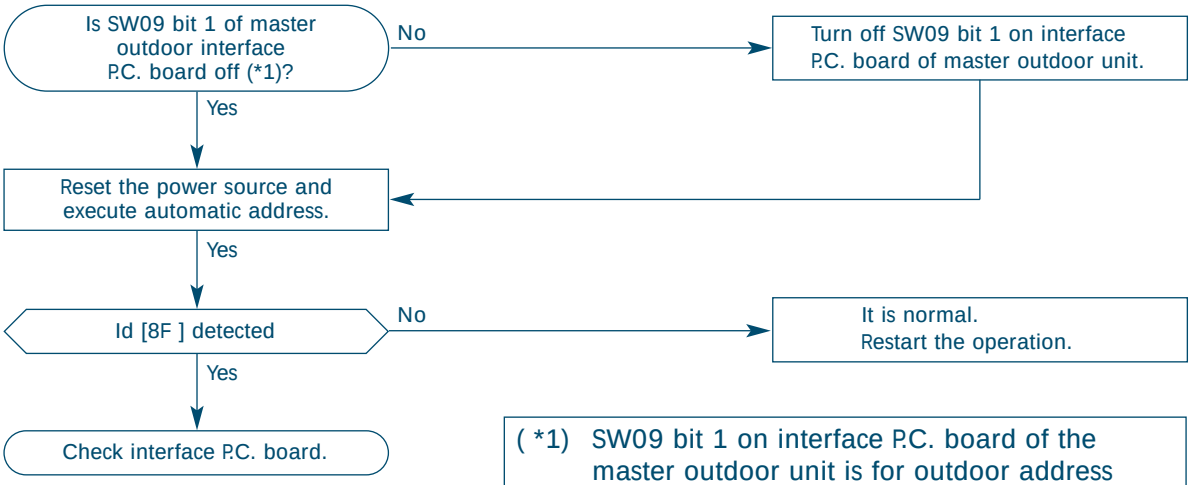
(Display on the 7 segment display: [Er.] [CL])

Check code	Operation cause
[8E] Outdoor unit connection over limit	1. No. of connected outdoor units over limit 2. Connection error of communication cable between outdoor units


Is the No. of connected outdoor units 5 or below?
No
The maximum number of outdoor units is 5.
Yes
Is the communication cable connected between outdoor units?
No
Check connection of communication cable.
Yes
Check interface P.C. board.

Diagnostic Procedure for Check Code

Check code	Operation cause
[8F] Duplicated terminal outdoor addresses	1. Address setup of outdoor unit was duplicated 2. Interface P.C. board error


Is SW09 bit 1 of master outdoor interface P.C. board off (*1)?
No
Turn off SW09 bit 1 on interface P.C. board of master outdoor unit.
Yes
Reset the power source and execute automatic address.
Yes
Id [8F] detected
No
It is normal.
Restart the operation.
Yes
Check interface P.C. board.

(*1) SW09 bit 1 on interface P.C. board of the master outdoor unit is for outdoor address setting.

OFF = Automatic addressing (factory set).
ON = Manual addressing.

Check code	Operation cause
[93] Indoor TC1 sensor alarm	TC1 sensor error

Check connection of TC1 sensor (TC1 sensor: CN20), disconnection of circuit, and characteristics of sensor resistance value.

If the sensor is normal, replace indoor P.C. board.

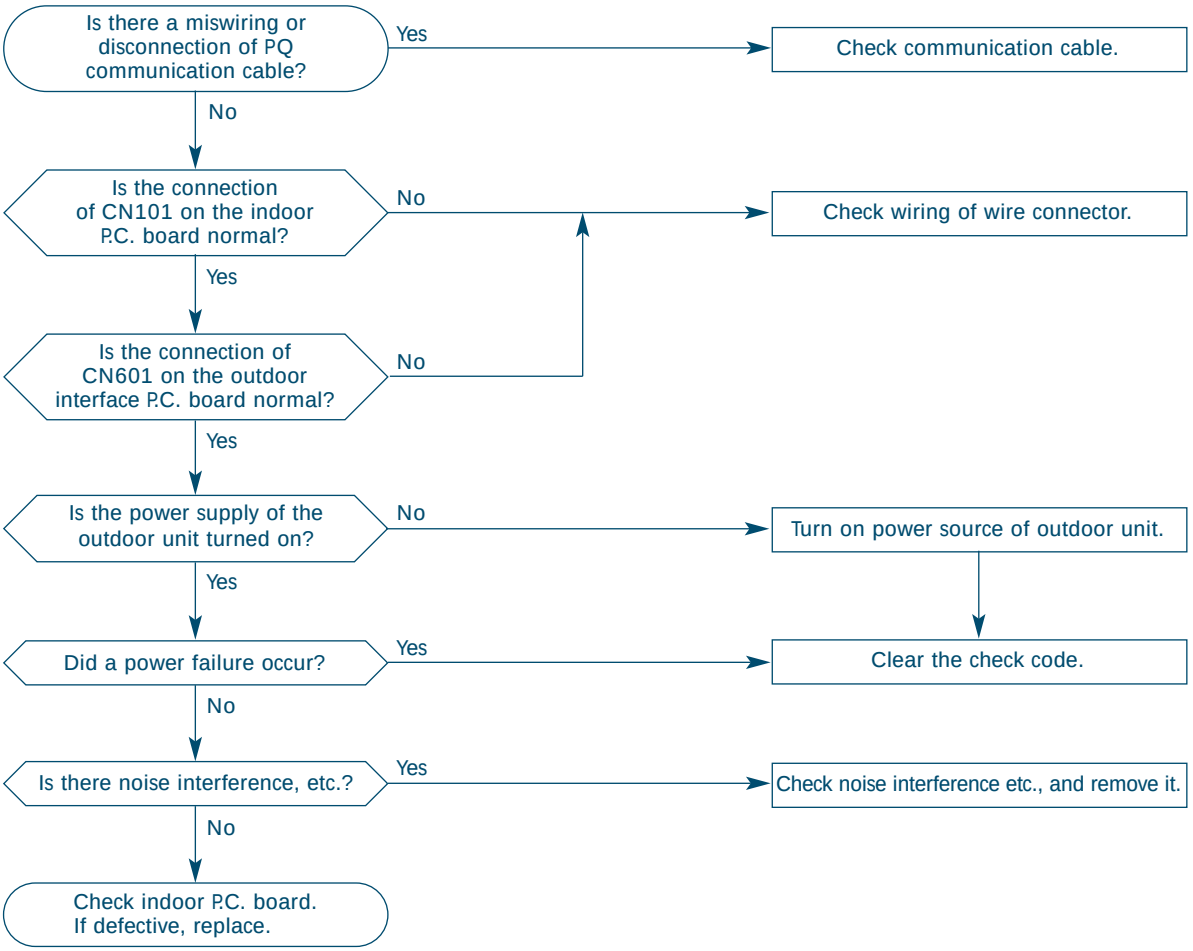
Check code	Operation cause
[94] Indoor TC2 sensor alarm	TC2 sensor error

Check connection of TC2 sensor (TC2 sensor: CN05), disconnection of circuit, and characteristics of sensor resistance value.

If the sensor is normal, replace indoor P.C. board.

Diagnostic Procedure for Check Code

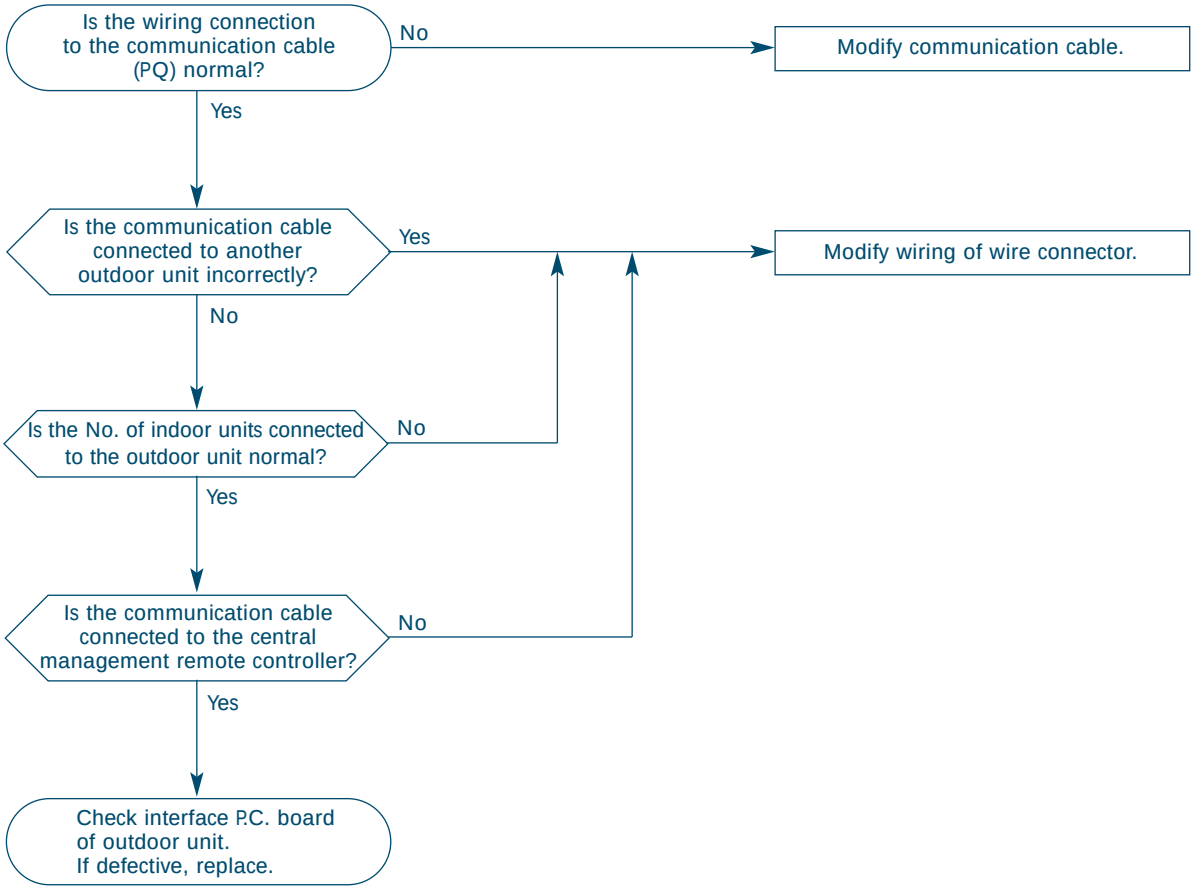
Check code	Operation cause
[95] Communication alarm between indoor and outdoor	1. Connection error of communication cable (PQ) between indoor and outdoor units 2. Connection error of connector for indoor communication, P.C. board error 3. Connection error of connector for outdoor communication, interface P.C. board error



NOTE:
1. When first turning on the power supply of the indoor unit, and when pushing the START/STOP button before turning on the power supply of the outdoor unit, “95” may be displayed. This is not abnormal therefore clear the check code.
2. If “95” is displayed only on the 7 segment of the outdoor unit, it is considered that power supply of the master outdoor unit is not switched on, or a P.C. board error of the master outdoor unit has occurred.

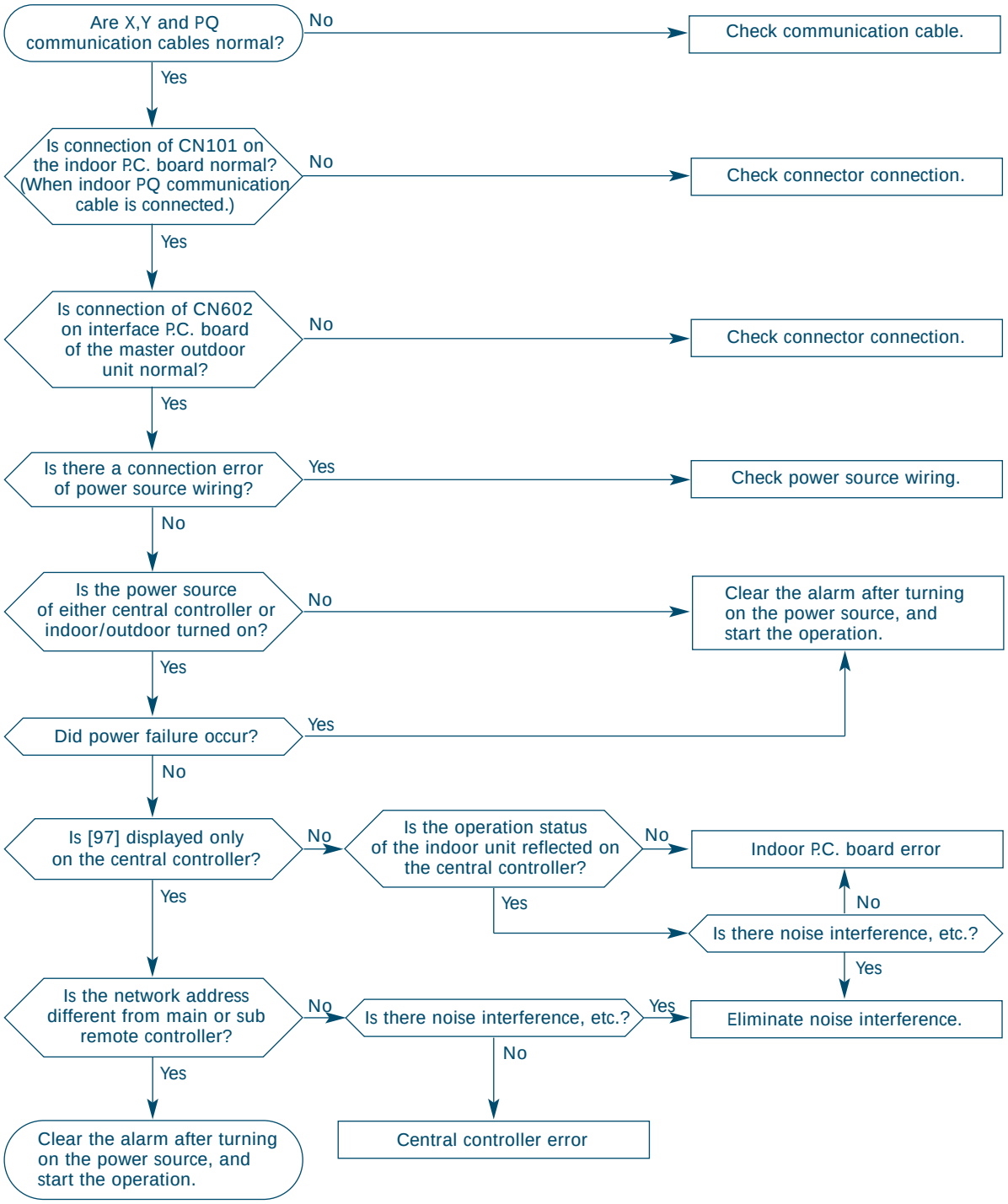
Diagnostic Procedure for Check Code

Check code	Operation cause
[96] Consistency detection of indoor and outdoor addresses	1. Connection error of communication cable (PQ) between indoor and outdoor units 2. Abnormal No. of connected indoor units 3. Wiring connection error of central management remote controller


Is the wiring connection to the communication cable (PQ) normal?
No
Modify communication cable.
Yes
Is the communication cable connected to another outdoor unit incorrectly?
Yes
Modify wiring of wire connector.
No
Is the No. of indoor units connected to the outdoor unit normal?
No
Yes
Is the communication cable connected to the central management remote controller?
No
Yes
Check interface P.C. board of outdoor unit.
If defective, replace.

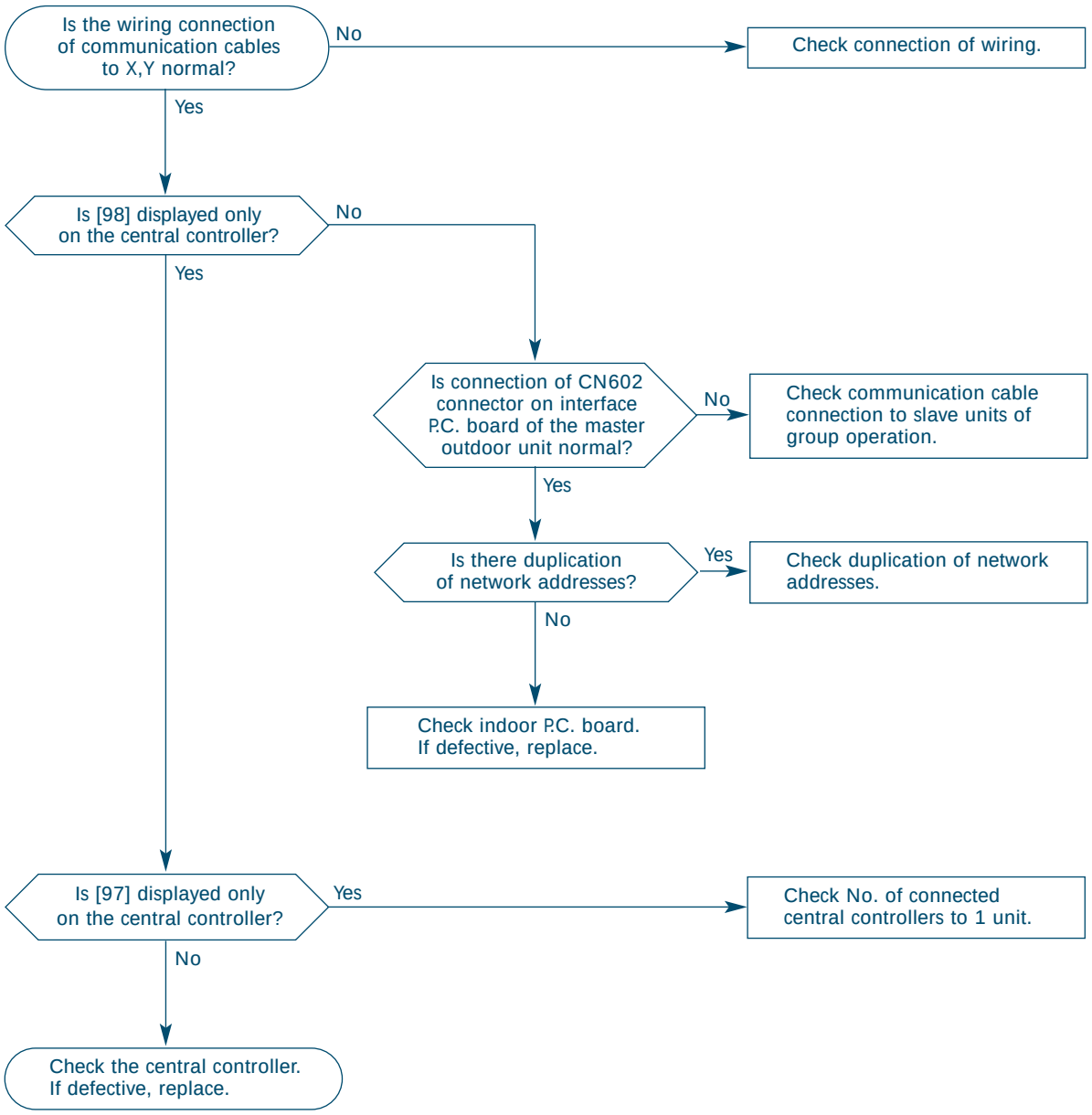
Diagnostic Procedure for Check Code

Check code	Operation cause
[97] BUS communication alarm (1)	1. Connection error of communication cable (PQ) between indoor and outdoor units 2. Connection error of (XY) for outdoor units 3. Power source system error of the central controller and indoor unit 4. Noise of peripheral devices 5. Power failure 6. Indoor P.C. board error, central controller error


Are X,Y and PQ communication cables normal?
No
Check communication cable.
Yes
Is connection of CN101 on the indoor P.C. board normal? (When indoor PQ communication cable is connected.)
No
Check connector connection.
Yes
Is connection of CN602 on interface P.C. board of the master outdoor unit normal?
No
Check connector connection.
Yes
Is there a connection error of power source wiring?
Yes
Check power source wiring.
No
Is the power source of either central controller or indoor/outdoor turned on?
No
Clear the alarm after turning on the power source, and start the operation.
Yes
Did power failure occur?
Yes
No
Is [97] displayed only on the central controller?
No
Is the operation status of the indoor unit reflected on the central controller?
No
Indoor P.C. board error
Yes
Yes
No
Is there noise interference, etc.?
Yes
Is the network address different from main or sub remote controller?
No
Is there noise interference, etc.?
Yes
Eliminate noise interference.
No
Yes
Clear the alarm after turning on the power source, and start the operation.
Central controller error

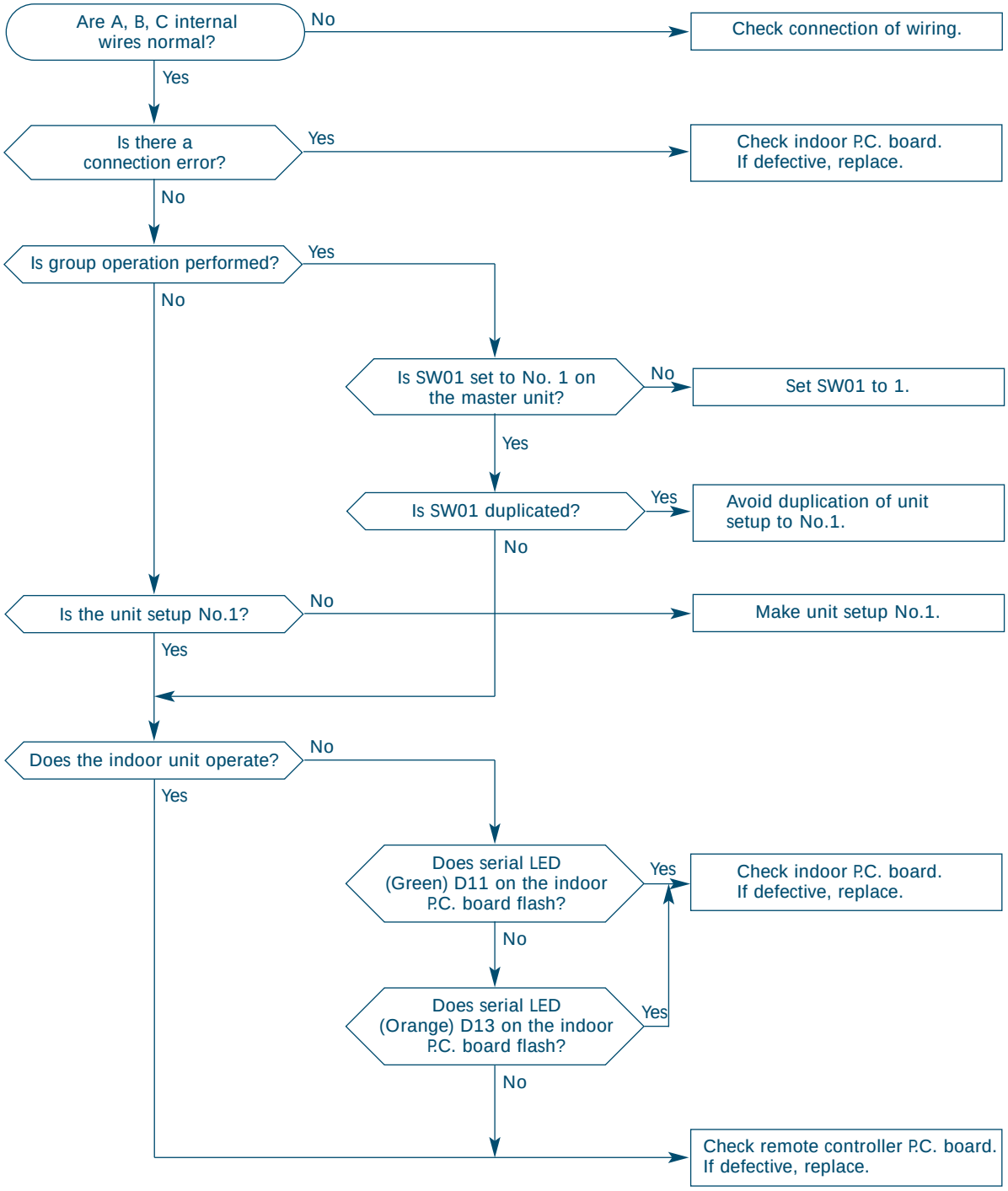
Diagnostic Procedure for Check Code

Check code	Operation cause
[98] BUS communication alarm (2)	1. Miswiring of XY communication cables 2. Duplicated network addresses 3. Indoor P.C. board error, central controller error


Is the wiring connection of communication cables to X,Y normal?
No
Check connection of wiring.
Yes
Is [98] displayed only on the central controller?
No
Yes
Is connection of CN602 connector on interface P.C. board of the master outdoor unit normal?
No
Check communication cable connection to slave units of group operation.
Yes
Is there duplication of network addresses?
Yes
Check duplication of network addresses.
No
Check indoor P.C. board. If defective, replace.
Is [97] displayed only on the central controller?
Yes
Check No. of connected central controllers to 1 unit.
No
Check the central controller. If defective, replace.

Diagnostic Procedure for Check Code

Check code	Operation cause
[99] Indoor remote controller communication alarm	1. Remote controller circuit connection error 2. Duplicated indoor No.1 units 3. Remote controller error 4. Indoor P.C. board error



Diagnostic Procedure for Check Code

Check code	Operation cause
[9A] Miswiring/Misconnection of indoor	1. Miswiring/Mispiping of indoor/outdoor units 2. Insufficient refrigerant 3. Blockage in pipe run

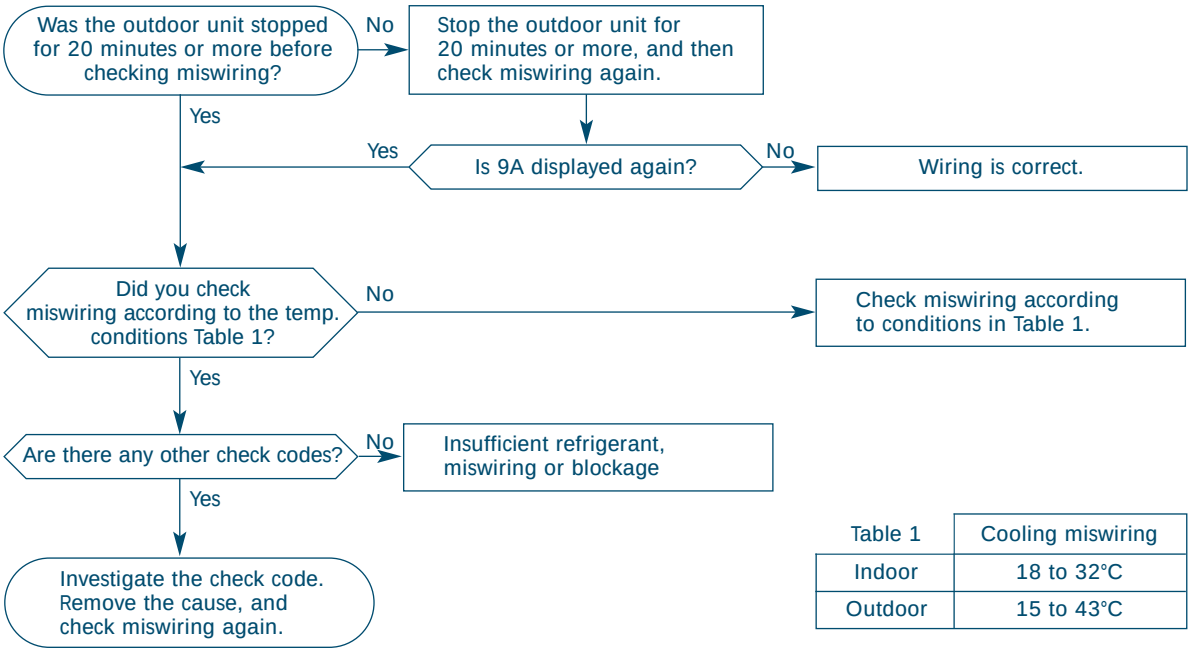
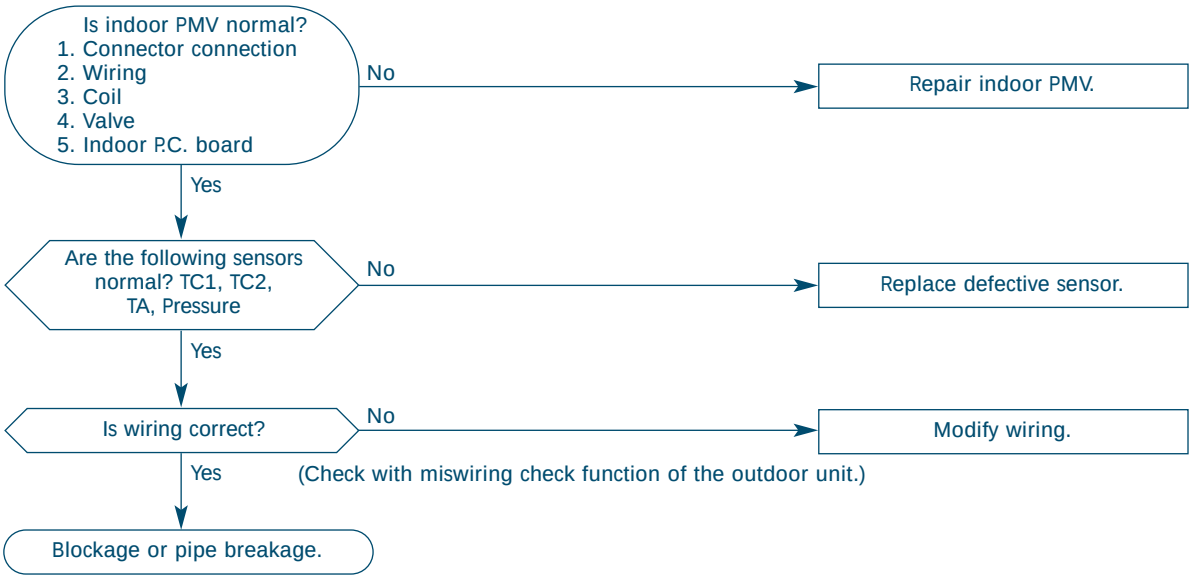

Was the outdoor unit stopped for 20 minutes or more before checking miswiring?
No
Stop the outdoor unit for 20 minutes or more, and then check miswiring again.
Yes
Yes
Is 9A displayed again?
No
Wiring is correct.
Did you check miswiring according to the temp. conditions Table 1?
No
Check miswiring according to conditions in Table 1.
Yes
Are there any other check codes?
No
Insufficient refrigerant, miswiring or blockage
Yes
Investigate the check code. Remove the cause, and check miswiring again.

Table 1	Cooling miswiring
Indoor	18 to 32°C
Outdoor	15 to 43°C

Check code	Operation cause
[9F] Indoor PMV blockage	1. Indoor unit PMV connection error/main unit error 2. TC1 sensor/TC2 sensor/TA sensor error 3. Miswiring/Mispiping between indoor and outdoor units 4. Blockage in pipe



Diagnostic Procedure for Check Code

Check code	Operation cause
[A0] TD1 sensor alarm	TD1 sensor open/short

Open/short of TD1 sensor was detected. Check connector (TD1 sensor: CN502) and characteristics of sensor resistance value.

When sensor is normal, replace interface P.C. board of the outdoor unit.

Check code	Operation cause
[A1] TD2 sensor alarm	TD2 sensor open/short

Open/short of TD2 sensor was detected. Check connector (TD2 sensor: CN503) and characteristics of sensor resistance value.

When sensor is normal, replace interface P.C. board of the outdoor unit.

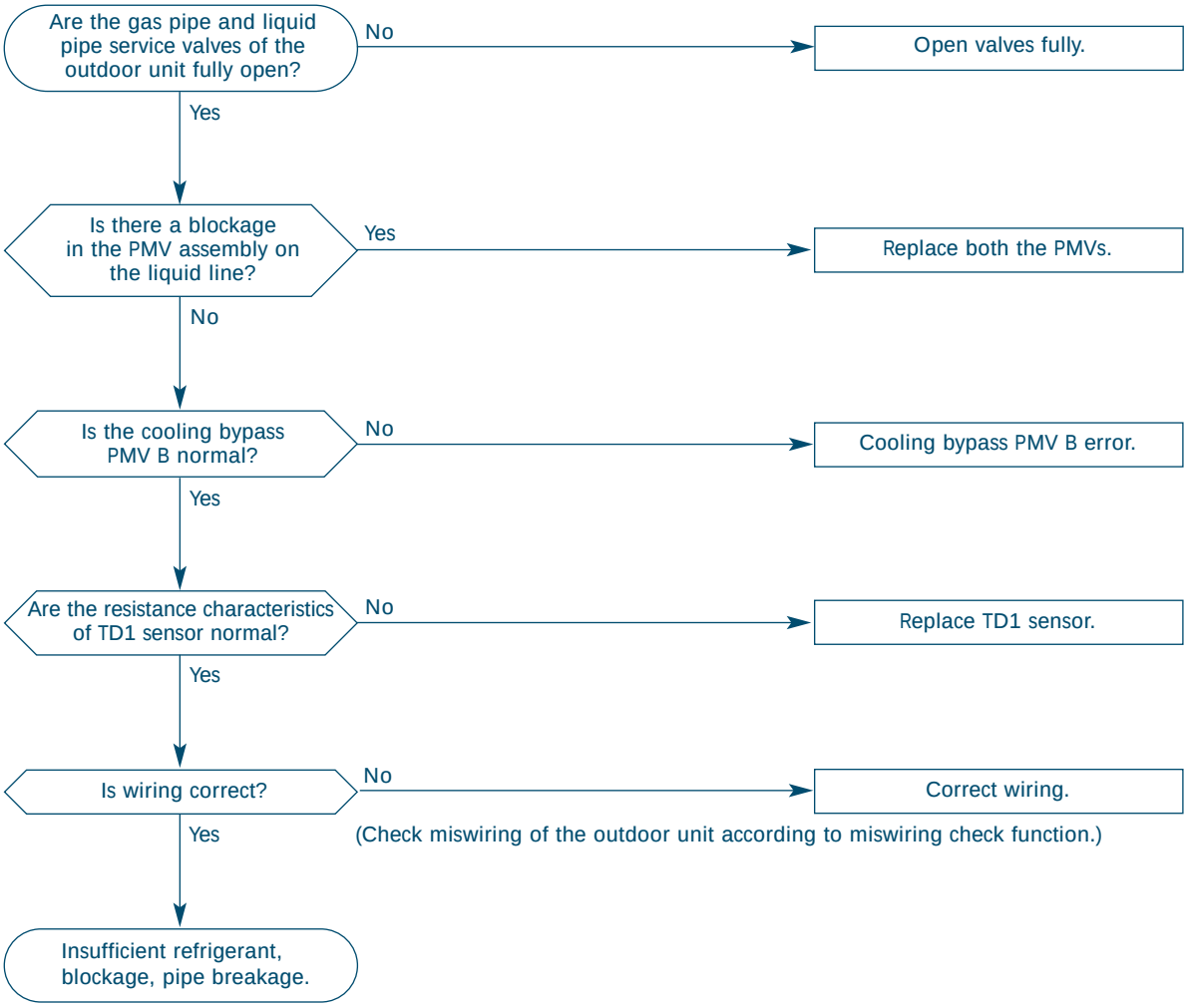
Check code	Operation cause
[A2] TS1 sensor alarm	TS1 sensor open/short

Open/short of TS1 sensor was detected. Check connector (TS1 sensor: CN504) and characteristics of sensor resistance value.

When sensor is normal, replace interface P.C. board of the outdoor unit.

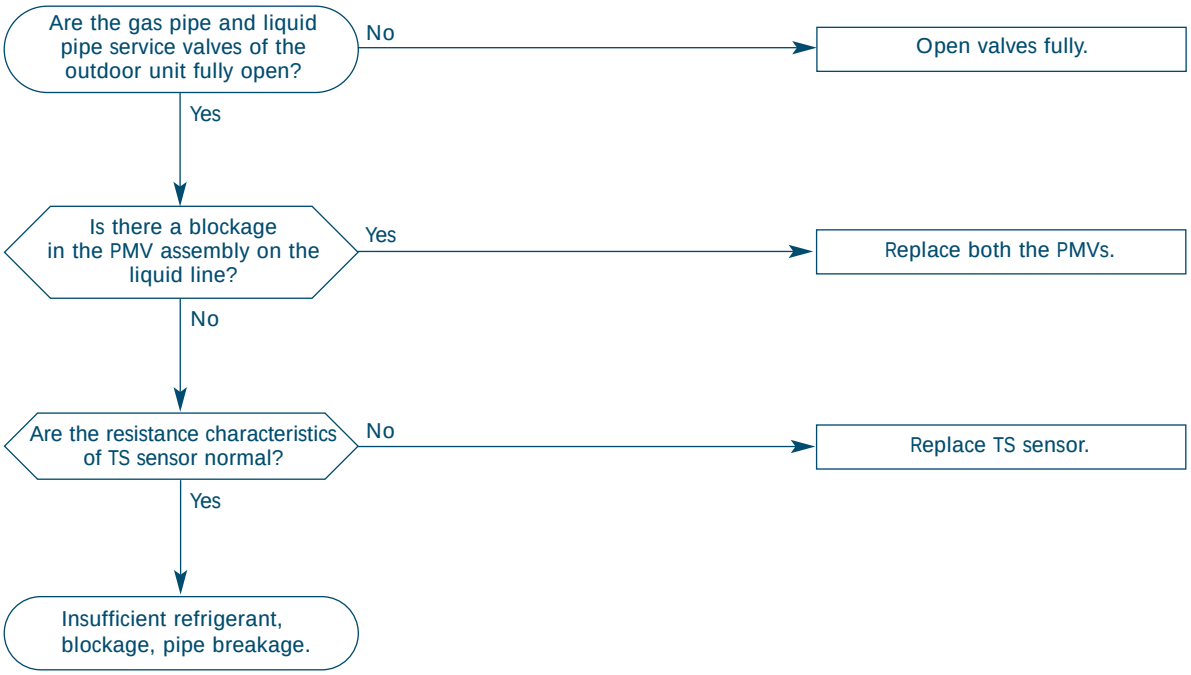
Diagnostic Procedure for Check Code

Check code	Operation cause
[A6] **Discharge temperature TD1 alarm**	1. Outdoor unit service valve closed 2. Cooling bypass PMV error 3. TD sensor error 4. Insufficient refrigerant, blockage in pipe 5. Blockage of PMV assembly on the liquid line


Are the gas pipe and liquid pipe service valves of the outdoor unit fully open?
No
Open valves fully.
Yes
Is there a blockage in the PMV assembly on the liquid line?
Yes
Replace both the PMVs.
No
Is the cooling bypass PMV B normal?
No
Cooling bypass PMV B error.
Yes
Are the resistance characteristics of TD1 sensor normal?
No
Replace TD1 sensor.
Yes
Is wiring correct?
No
Correct wiring.
(Check miswiring of the outdoor unit according to miswiring check function.)
Yes
Insufficient refrigerant, blockage, pipe breakage.

Diagnostic Procedure for Check Code

Check code	Operation cause
[A7] **TS condition gas leak detection**	1. Outdoor unit service valve closed 2. Blockage PMV assembly on the liquid line 3. TS sensor error 4. Insufficient refrigerant, blockage in pipe


Are the gas pipe and liquid pipe service valves of the outdoor unit fully open?
No
Open valves fully.
Yes
Is there a blockage in the PMV assembly on the liquid line?
Yes
Replace both the PMVs.
No
Are the resistance characteristics of TS sensor normal?
No
Replace TS sensor.
Yes
Insufficient refrigerant, blockage, pipe breakage.

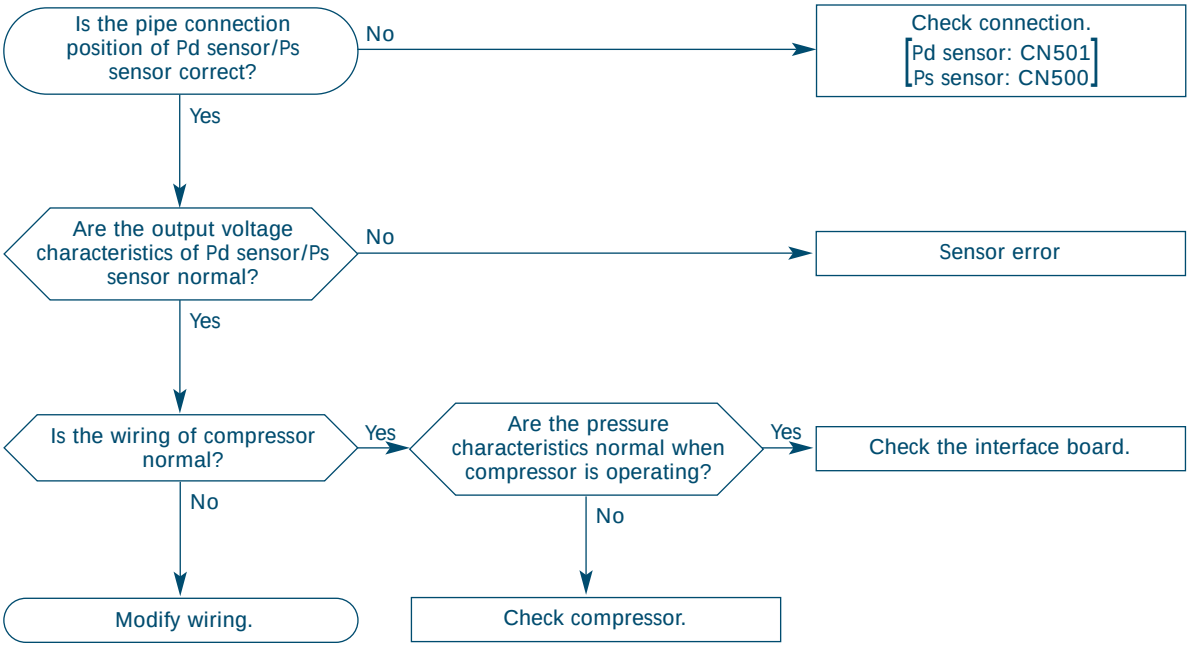
Check code	Operation cause
[AA] **Pd sensor alarm**	Pd sensor output voltage alarm

If there is an abnormal output voltage of Pd sensor: Check connector circuit (Pd sensor: CN501) and output voltage of the sensor.

If the sensor is normal, replace the outdoor interface P.C. board.

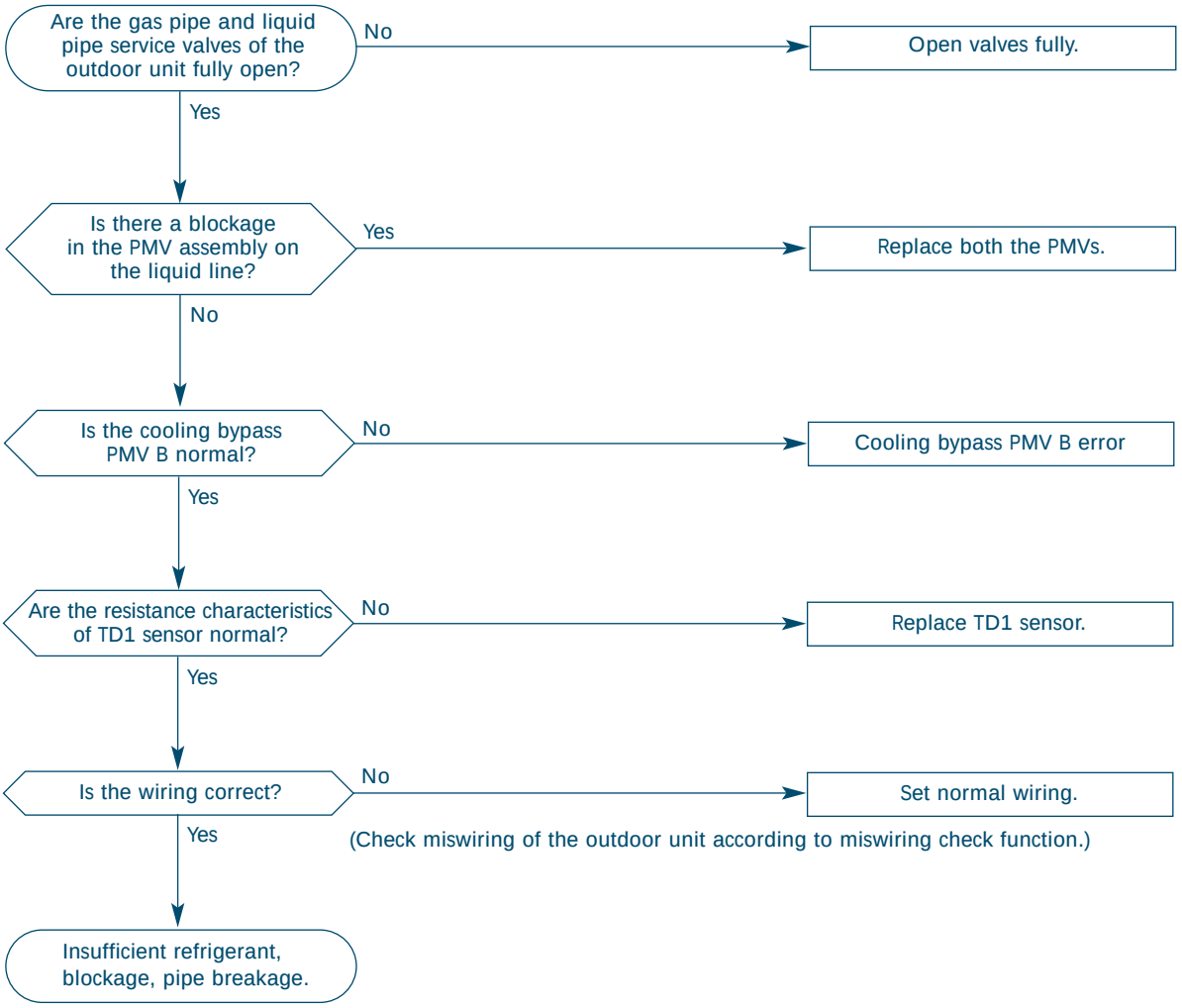
Diagnostic Procedure for Check Code

Check code	Operation cause
[Ab] **Pressure sensor misconnection**	1. Connector misconnection of Pd/Ps sensors 2. Pd/Ps sensor error 3. Compressor inverse operation, compressor error



Diagnostic Procedure for Check Code

Check code	Operation cause
[AE] **TD1 condition gas leak detection**	1. Outdoor unit service valve closed 2. Cooling bypass PMV error 3. TD1 sensor error 4. Insufficient refrigerant, blockage in pipe 5. Blockage of indoor filter 6. Blockage of PMV assembly on the liquid line

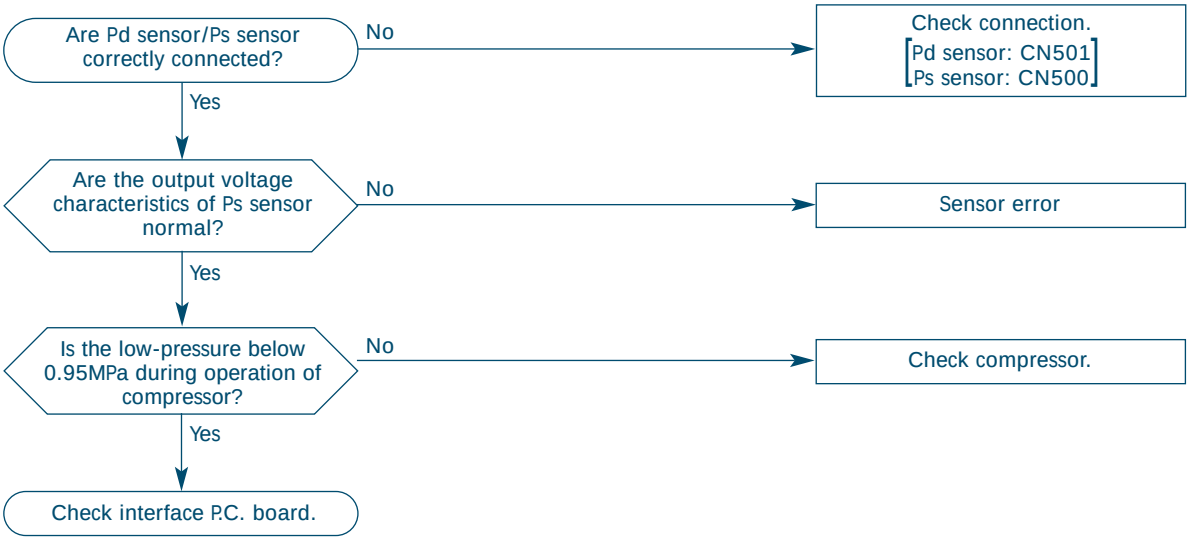

Are the gas pipe and liquid pipe service valves of the outdoor unit fully open?
No
Open valves fully.
Yes
Is there a blockage in the PMV assembly on the liquid line?
Yes
Replace both the PMVs.
No
Is the cooling bypass PMV B normal?
No
Cooling bypass PMV B error
Yes
Are the resistance characteristics of TD1 sensor normal?
No
Replace TD1 sensor.
Yes
Is the wiring correct?
No
Set normal wiring.
(Check miswiring of the outdoor unit according to miswiring check function.)
Yes
Insufficient refrigerant, blockage, pipe breakage.

Check code	Operation cause
[AF] **Phase order alarm**	Abnormal power phase order or missing phase of power supply to the outdoor unit

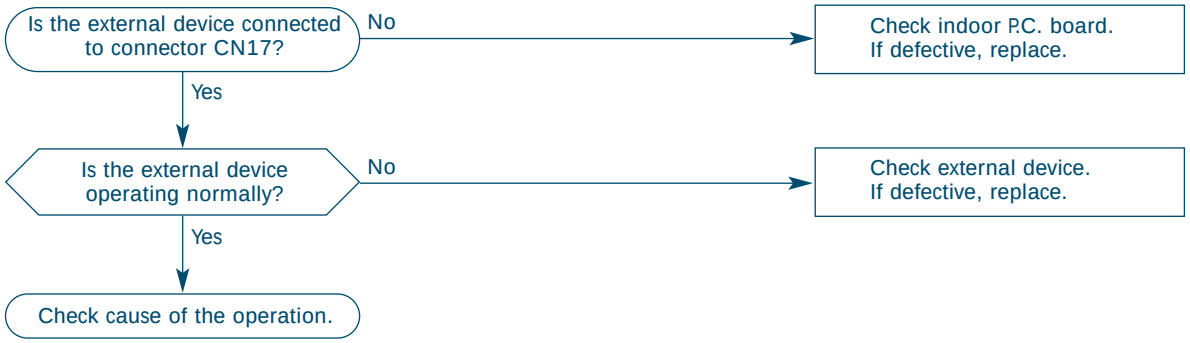
There is an abnormal power phase order or missing phase of power supply to the outdoor unit. Check power supply wiring.

Diagnostic Procedure for Check Code

Check code	Operation cause
[b4] Ps sensor alarm	1. Ps sensor error 2. Ps sensor connection error 3. Compressor error



Check code	Operation cause
[b5] Indoor outside input alarm [b6] Indoor outside interlock	1. External device error 2. Indoor P.C. board error



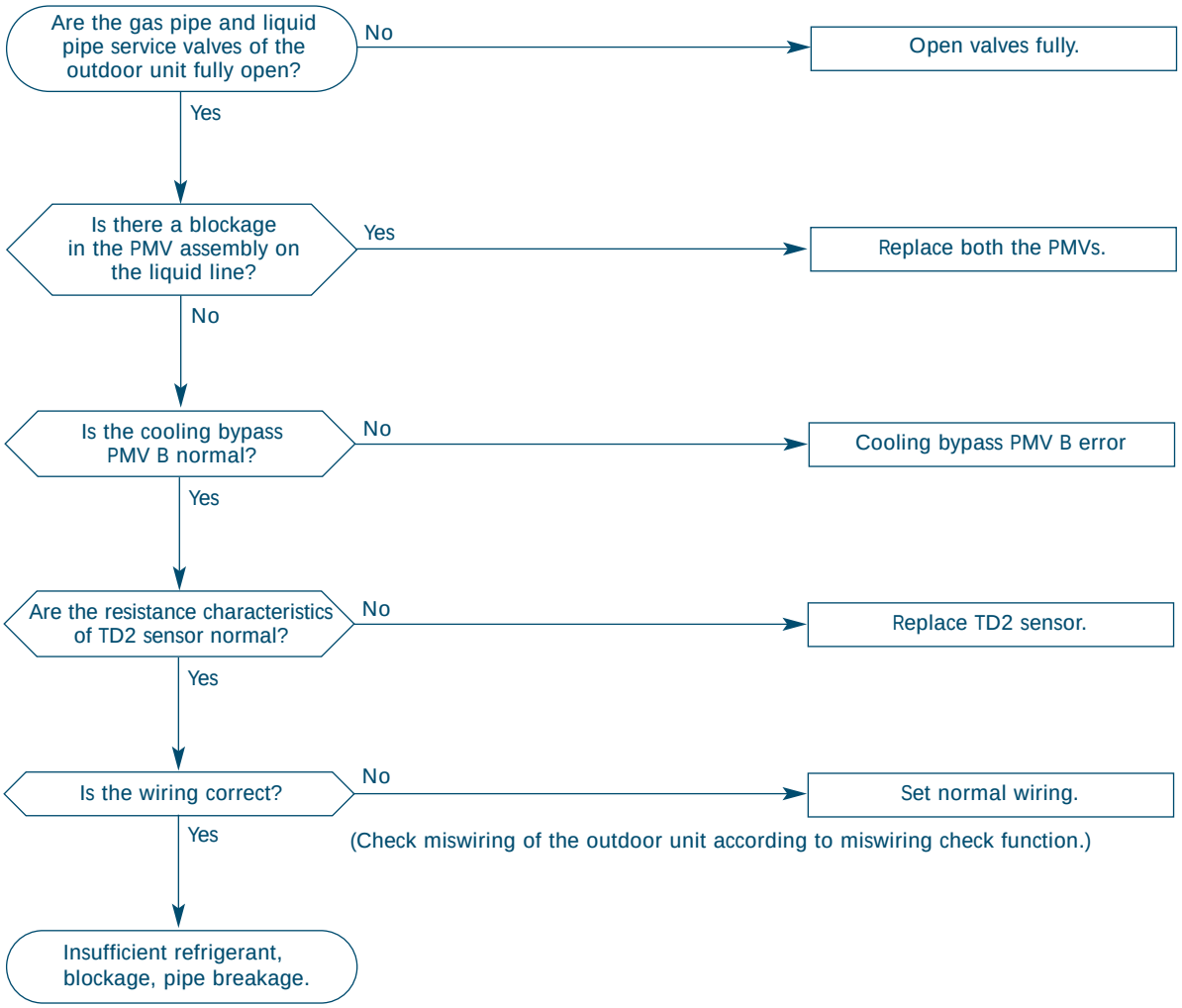
Check code	Operation cause
[b9] Indoor pressure sensor alarm	Output voltage error of indoor pressure sensor

There is an abnormal output voltage of indoor pressure sensor. Check connector (CN23) and output voltage of the sensor.

If the sensor is normal, replace the indoor P.C. board.

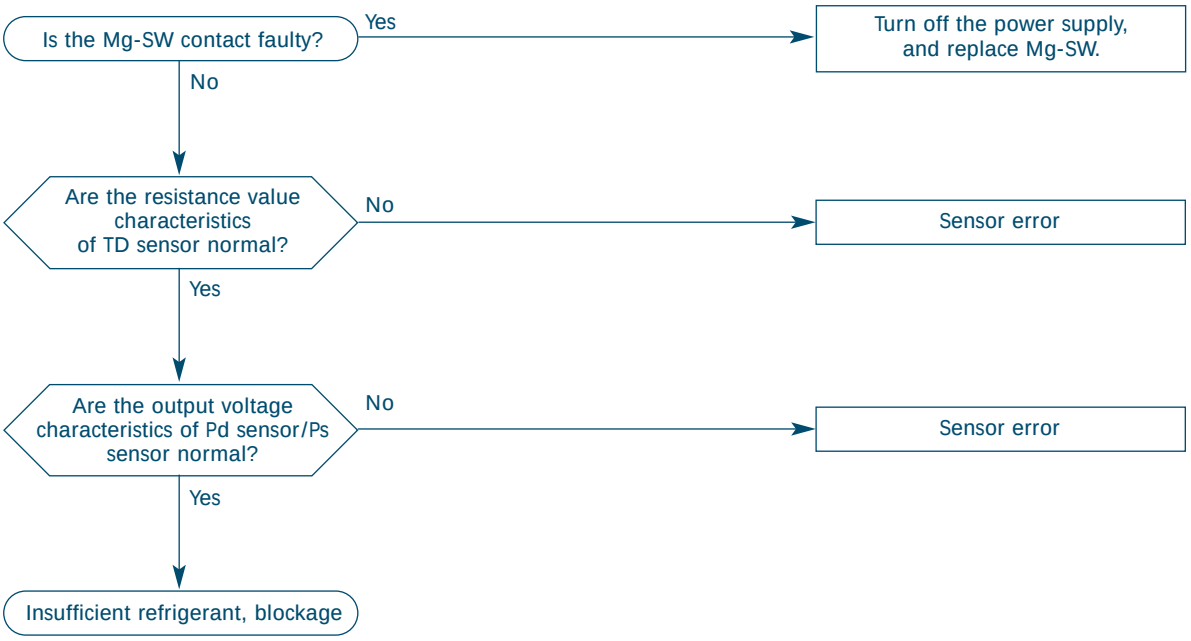
Diagnostic Procedure for Check Code

Check code	Operation cause
[bb] Discharge temperature TD2 alarm	1. Outdoor unit service valve closed 2. Cooling bypass PMV error 3. TD sensor error 4. Insufficient refrigerant, blockage in pipe 5. Blockage of PMV assembly on the liquid line


Are the gas pipe and liquid pipe service valves of the outdoor unit fully open?
No
Open valves fully.
Yes
Is there a blockage in the PMV assembly on the liquid line?
Yes
Replace both the PMVs.
No
Is the cooling bypass PMV B normal?
No
Cooling bypass PMV B error
Yes
Are the resistance characteristics of TD2 sensor normal?
No
Replace TD2 sensor.
Yes
Is the wiring correct?
No
Set normal wiring.
(Check miswiring of the outdoor unit according to miswiring check function.)
Yes
Insufficient refrigerant, blockage, pipe breakage.

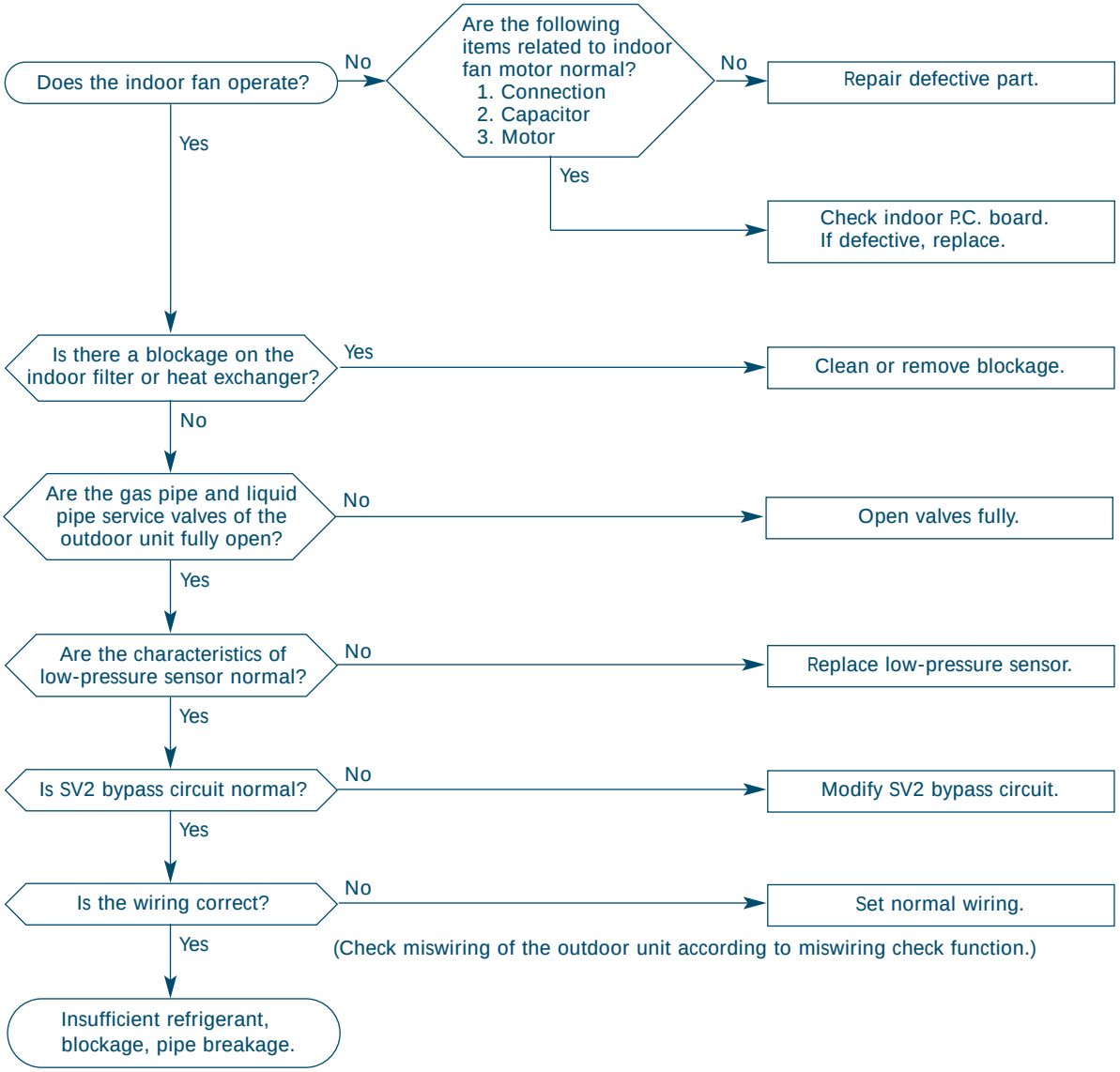
Diagnostic Procedure for Check Code

Check code	Operation cause
[bd] **Mg-SW protective operation**	1. Mg-SW contact deposit protective operation 2. TD sensor error 3. Pd sensor/Ps sensor error 4. Insufficient refrigerant, blockage in pipe



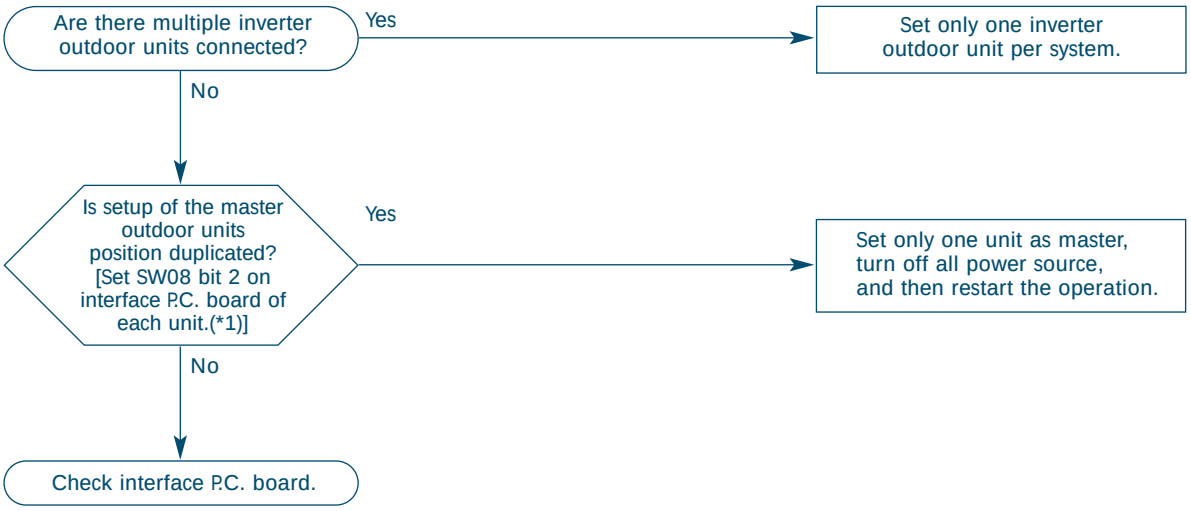
Diagnostic Procedure for Check Code

Check code	Operation cause
[bE] **Low-pressure protective operation**	1. Ps sensor error 2. Service valve closed 3. Indoor fan capacitor error 4. Indoor/outdoor PMV blockage 5. Indoor heat exchanger blockage 6. SV2 circuit 7. Incorrect wiring of communication cable between indoor and outdoor units



Diagnostic Procedure for Check Code

Check code	Operation cause
[d1] **Master outdoor unit setup alarm**	1. No. of connected inverter outdoor units 2. Incorrect setup of master outdoor unit 3. Defective outdoor interface P.C. board


Are there multiple inverter outdoor units connected?
Yes
Set only one inverter outdoor unit per system.
No
Is setup of the master outdoor units position duplicated? [Set SW08 bit 2 on interface P.C. board of each unit.(*1)]
Yes
Set only one unit as master, turn off all power source, and then restart the operation.
No
Check interface P.C. board.

(*1) Setup of outdoor unit at center position (SW08 bit 2 setup on outdoor interface P.C. board)

OFF: Slave/ON: Master (Automatic setup for inverter outdoor unit)

Diagnostic Procedure for Check Code

Check code	Operation cause
[d2] Slave outdoor unit alarm	Defective slave outdoor unit

An error occurs in the slave outdoor unit. Confirm the check code of the slave unit, and check it according to the diagnostic procedure for each check code.

Check code	Operation cause
[d3] TH sensor alarm	Error of temp. sensor incorporated in IGBT (Inverter Gate Bi-Polar Transistor)

There is an error with the temp. sensor incorporated in IGBT. Check connectors CN07 on IPDU P.C. board and CN600 on interface P.C. board. If there is no problem, replace IPDU P.C. board.

Check code	Operation cause
[d4] TK1 sensor alarm	TK1 sensor open/short

Open/short of TK1 was detected. Check connection (TK1 sensor: CN516) and resistance value characteristics of the sensor.

If sensor is normal, replace the outdoor interface P.C. board.

Check code	Operation cause
[d5] TK2 sensor alarm	TK2 sensor open/short

Open/short of TK2 was detected. Check connection (TK2 sensor: CN515) and resistance value characteristics of the sensor.

If sensor is normal, replace the outdoor interface P.C. board.

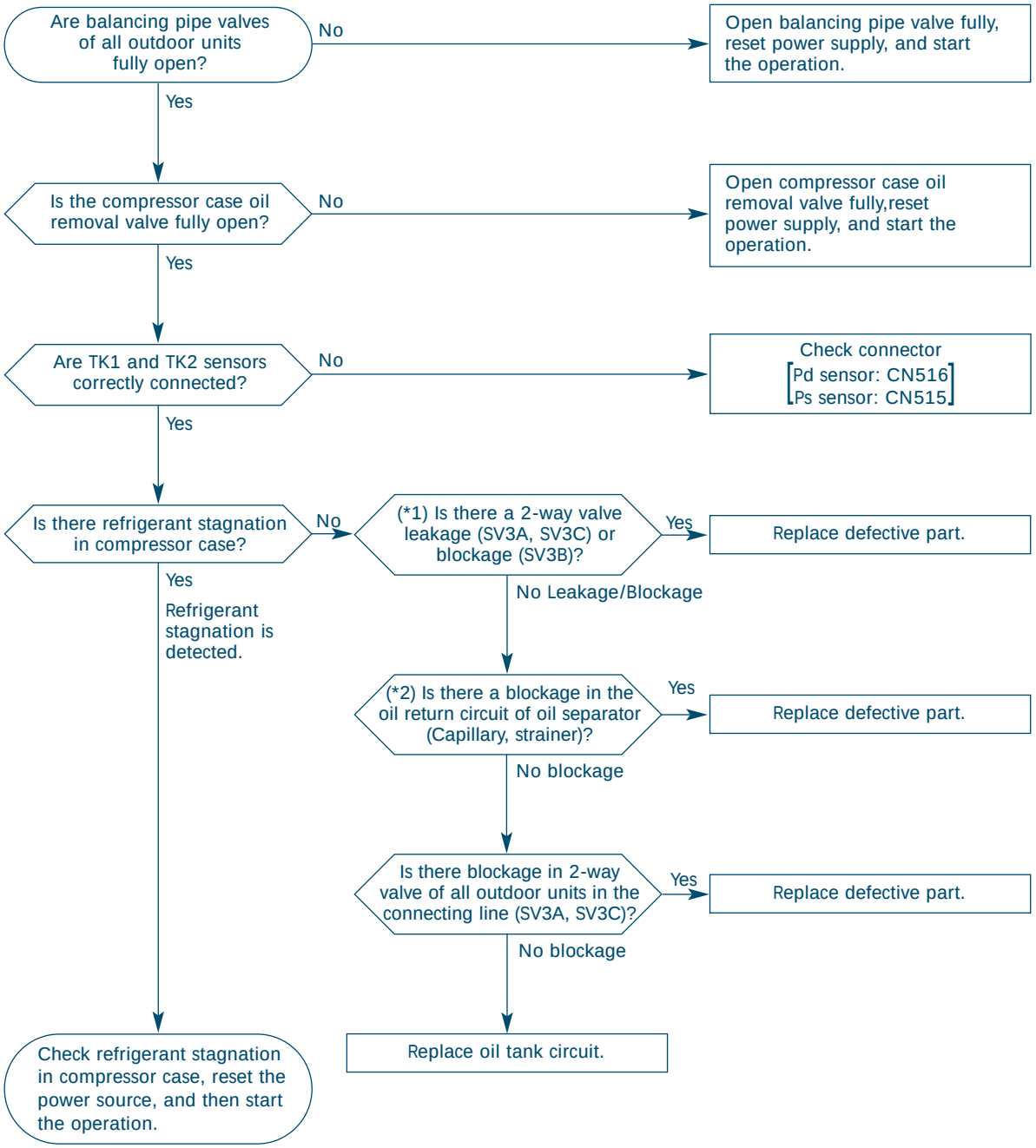
Check code	Operation cause
[d6] TK3 sensor alarm	TK3 sensor open/short

Open/short of TK3 was detected. Check connection (TK3 sensor: CN507) and resistance value characteristics of the sensor.

If sensor is normal, replace the outdoor interface P.C. board.

Diagnostic Procedure for Check Code

Check code	Operation cause
[d7] **Protection of low oil level detection**	1. Balancing pipe valve (all outdoor units in the connecting line) closed 2. Compressor case oil removal valve closed 3. Miswiring of TK1 sensor/TK2 sensor 4. Refrigerant stagnation in compressor case 5. SV3A, SV3B, SV3C valves error 6. Blockage in oil return circuit of oil separator 7. Blockage in oil tank circuit


Are balancing pipe valves of all outdoor units fully open?
No
Open balancing pipe valve fully, reset power supply, and start the operation.
Yes
Is the compressor case oil removal valve fully open?
No
Open compressor case oil removal valve fully,reset power supply, and start the operation.
Yes
Are TK1 and TK2 sensors correctly connected?
No
Check connector
[Pd sensor: CN516
Ps sensor: CN515]
Yes
Is there refrigerant stagnation in compressor case?
No
(*1) Is there a 2-way valve leakage (SV3A, SV3C) or blockage (SV3B)?
Yes
Replace defective part.
Yes
Refrigerant stagnation is detected.
No Leakage/Blockage
(*2) Is there a blockage in the oil return circuit of oil separator (Capillary, strainer)?
Yes
Replace defective part.
No blockage
Is there blockage in 2-way valve of all outdoor units in the connecting line (SV3A, SV3C)?
Yes
Replace defective part.
No blockage
Replace oil tank circuit.
Check refrigerant stagnation in compressor case, reset the power source, and then start the operation.

Diagnostic Procedure for Check Code

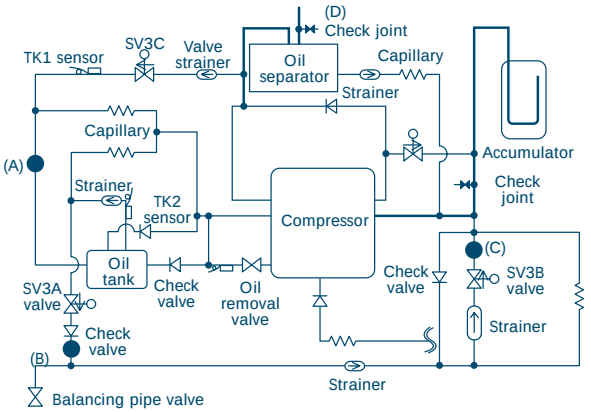
(*1) 2-way valve leakage/blockage check procedure

1. After resetting the power supply, start a trial operation.
2. Set SW01/SW02/SW03 on interface P.C. board to 1/16/1, respectively.
3. Check the 7 segment display of the interface P.C. board.

	7 segment display
When operation has started	"OL" "– –"
During detection of oil level	"OL" "FF" or "Numeral"
Judgement result of oil level	"OL" "AO" or "A1"

In case of judgment result "A0" → Oil level is adequate. Resume the operation.
In case of judgment result "A1" → Oil level is insufficient. Check the following items.
Remove SV3C valve coil, reset the power supply, and start the trial operation.

4. After operation for several minutes, check temperature at secondary side of SV3C valve (A).
   → When temperature is high (Equivalent to discharge temp.), leakage occurs from SV3C valve.
   Replace SV3C coil.
5. Remove SV3A coil, and start a trial operation under condition that AC220V–240V-power is on and SV3C valve is connected.
6. After operation for several minutes, check temperature at secondary side of SV3A valve (B).
   → When temperature is high (equivalent to discharge temp.), leakage occurs from SV3A valve.
   Replace SV3A coil.



7. Using charge hose, etc., connect the check joint of gas pipe (D) and the charge port of balancing pipe.
8. Start a trial operation under condition that AC220V–240V-power is and to SV3B valve is connected.
9. After operation for several minutes, check temperature at secondary side of SV3B valve (C).
   → When temperature is low (equivalent to suction temp.), blockage occurs in SV3B valve or strainer.
   Replace blocked part.

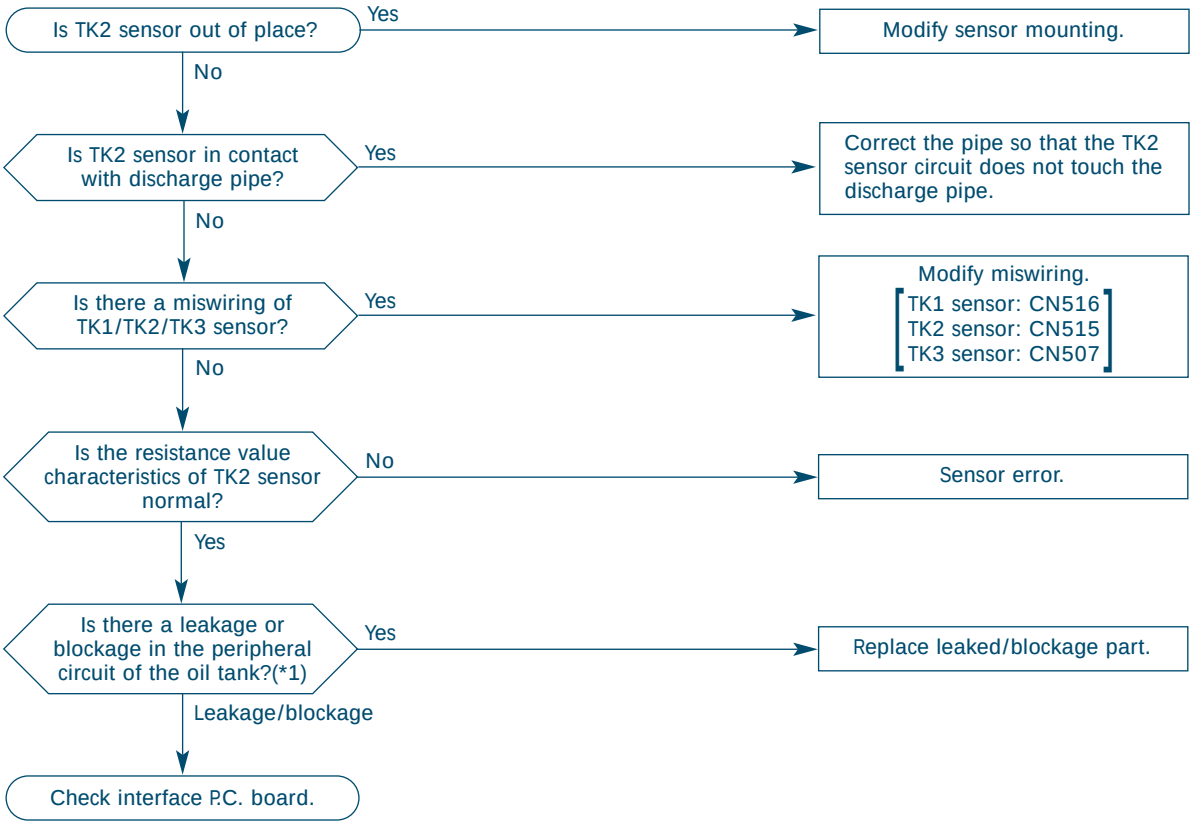
(*2) Blockage check procedure for oil return circuit of oil separator

1. Check temperature of oil circuit during operation of outdoor unit.
   → If temperature is low, clogging occurs in capillary or strainer. **Replace blocked part.**

Check code	Operation cause
[d8] TK1 temperature detection circuit alarm	TK1 sensor out of place, miswiring, resistance value characteristics error

Diagnostic Procedure for Check Code

Check code	Operation cause
[d9] TK2 temperature detection circuit alarm	1. TK2 sensor out of place, miswiring, resistance value characteristics error 2. Oil tank peripheral circuit error [Check valve leakage Capillary blockage Strainer blockage]



Diagnostic Procedure for Check Code

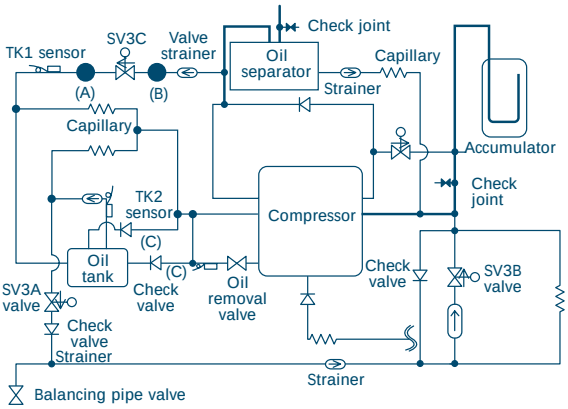
(*1) Oil tank peripheral circuit leakage/blockage check procedure

1. After resetting the power supply, start a trial operation.
2. Set SW01/SW02/SW03 on interface P.C. board to 1/16/1, respectively.
3. Check the 7 segment display of the interface P.C. board.

	7 segment display
When operation has started	"OL" "– –"
During detection of oil level	"OL" "FF" or "Numeral"
Judgement result of oil level	"OL" "AO" "A1" or "A4"

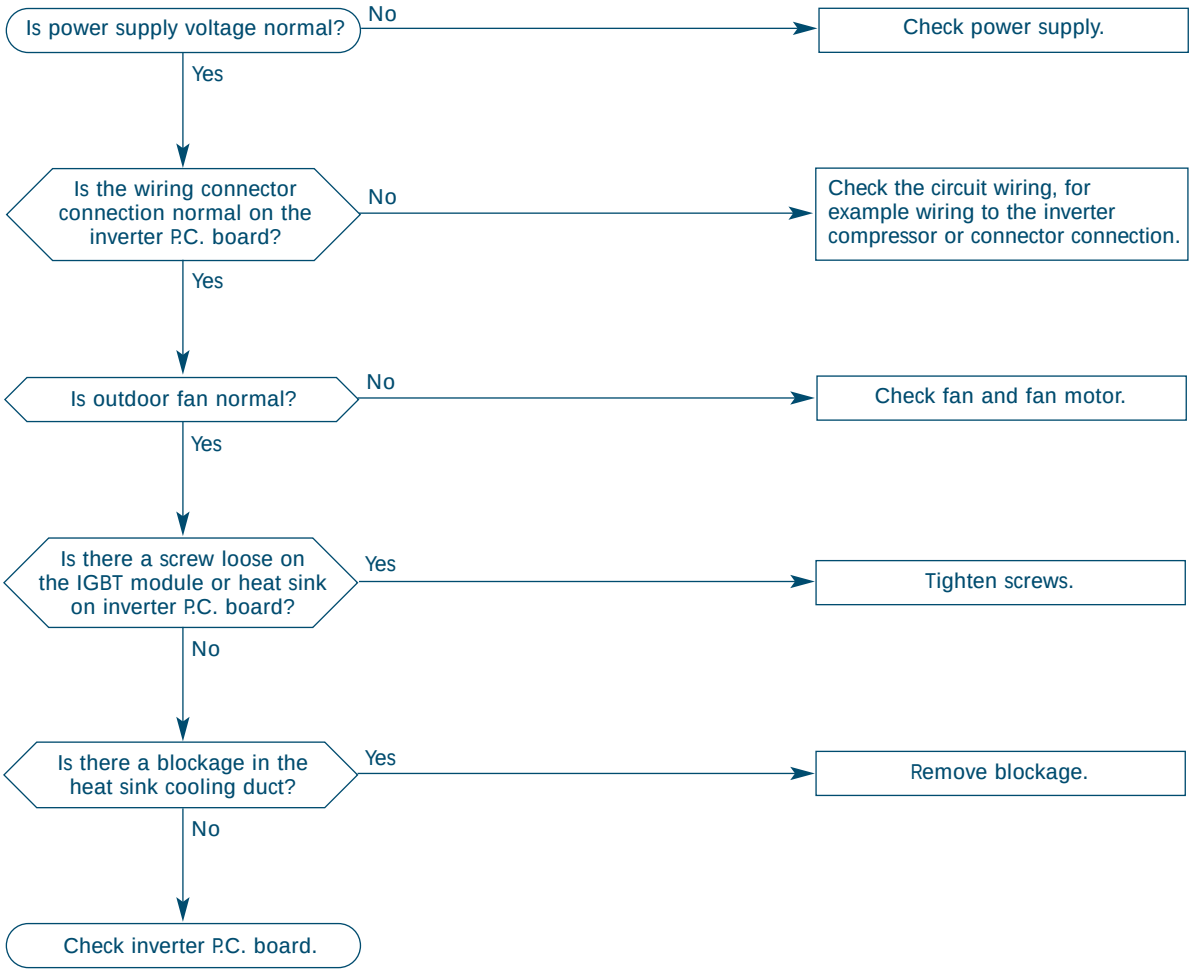
In case of judgment result "A0" "A1" → Oil level is adequate. Resume the operation.
In case of judgment result "A4" → Possibility of oil tank circuit leakage/blockage is considered.
Check the following items.

4. Start a trial operation, confirm that AC220V–240V-power is on to SV3C valve.
5. After operation for several minutes check the temperature at the secondary side of SV3C (A.)
   → When temperature is high (equivalent to discharge temperature at (B)), valve is not blocked.
   → **<u>If blocked part is found, replace the part.</u>**
6. During operation, check whether leakage occurs in the check valve (two positions) of pipe connecting the oil tank and compressor case. Check temperature either side of (C).
   → **<u>If leakage is found, replace the part.</u>**



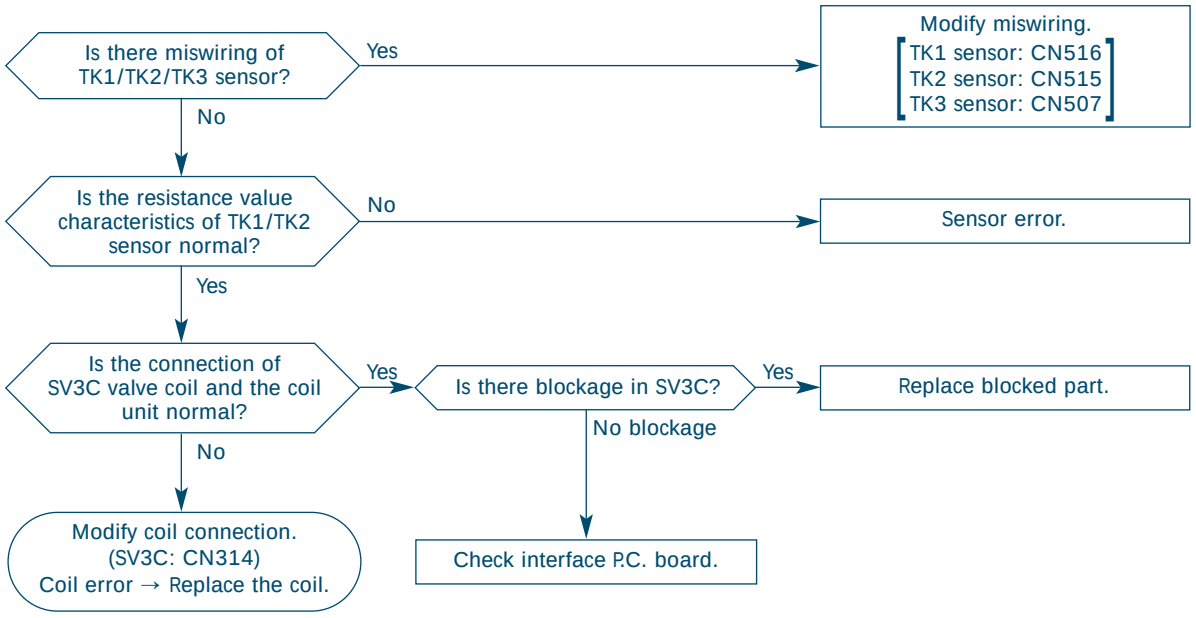
Diagnostic Procedure for Check Code

Check code	Operation cause
[dA] **Abnormal overheat of heat sink**	1. Power supply failure 2. Outdoor fan error 3. Heat sink installation failure 4. Blockage of heat sink cooling duct 5. Defective inverter P.C. board


Is power supply voltage normal?
No
Check power supply.
Yes
Is the wiring connector connection normal on the inverter P.C. board?
No
Check the circuit wiring, for example wiring to the inverter compressor or connector connection.
Yes
Is outdoor fan normal?
No
Check fan and fan motor.
Yes
Is there a screw loose on the IGBT module or heat sink on inverter P.C. board?
Yes
Tighten screws.
No
Is there a blockage in the heat sink cooling duct?
Yes
Remove blockage.
No
Check inverter P.C. board.

Diagnostic Procedure for Check Code

Check code	Operation cause
[db] Oil level detection circuit blockage detection	1. Blockage in SV3C valve 2. Blockage in SV3C valve circuit



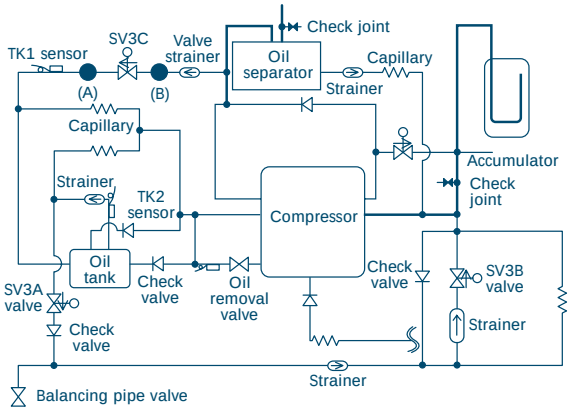
(*1) SV3C valve blockage check procedure

1. After resetting the power supply, start a trial operation.
2. Set SW01/SW02/SW03 on interface P.C. board to 1/16/1, respectively.
3. Check the 7 segment display of interface P.C. board.

	7 segment display
When operation has started	"OL" "– –"
During detection of oil level	"OL" "FF" or "Numeral"
Judgement result of oil level	"OL" "AO" "A1" or "A3"

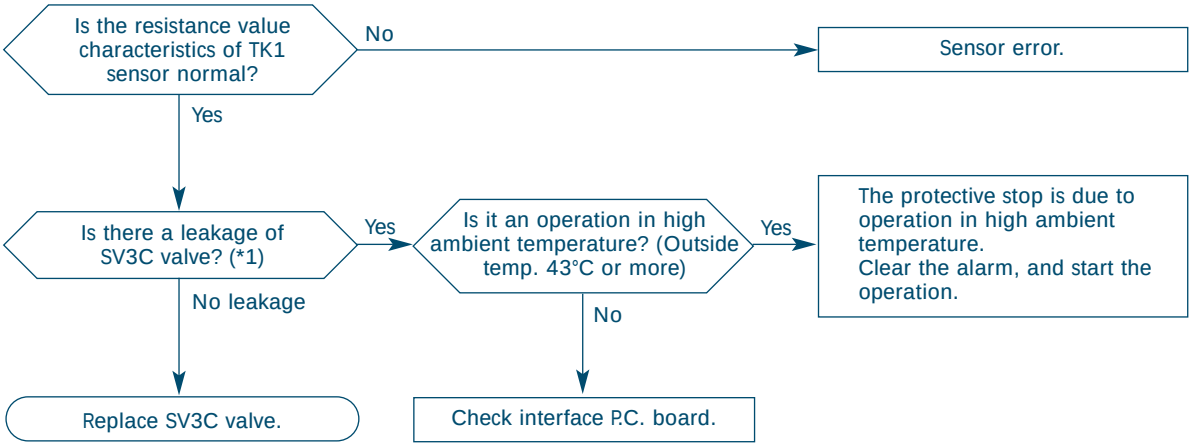
In case of judgment result "A0" "A1" → Oil level is adequate. Resume the operation.
In case of judgment result "A3" → Possibility of SV3C valve circuit blockage is considered.
Check the following items.

4. Start a trial operation, confirm that AC220V–240V-power is on to SV3C valve.
5. After operation for several minutes check the temperature at the secondary side of SV3C (A).
   → When temperature is high (equivalent to discharge temperature at (B)), valve is not blocked.
   → **<u>If blocked part is found, replace the part.</u>**



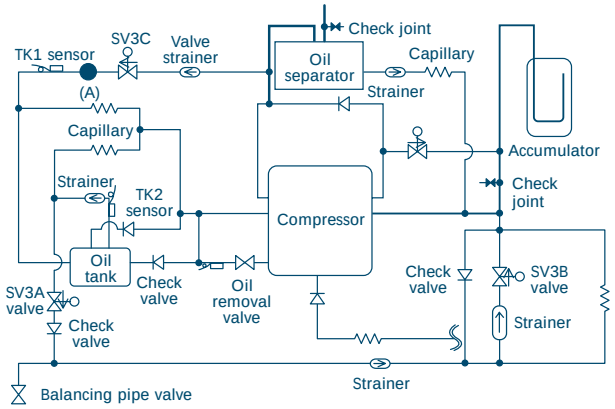
Diagnostic Procedure for Check Code

Check code	Operation cause
[dC] **Oil level detection circuit leakage detection**	1. SV3C valve leakage 2. TK1 sensor resistance value characteristics error 3. Outdoor unit operation in high external temperatures


Is the resistance value characteristics of TK1 sensor normal?
No
Sensor error.
Yes
Is there a leakage of SV3C valve? (*1)
Yes
Is it an operation in high ambient temperature? (Outside temp. 43°C or more)
Yes
The protective stop is due to operation in high ambient temperature.
Clear the alarm, and start the operation.
No leakage
No
Replace SV3C valve.
Check interface P.C. board.

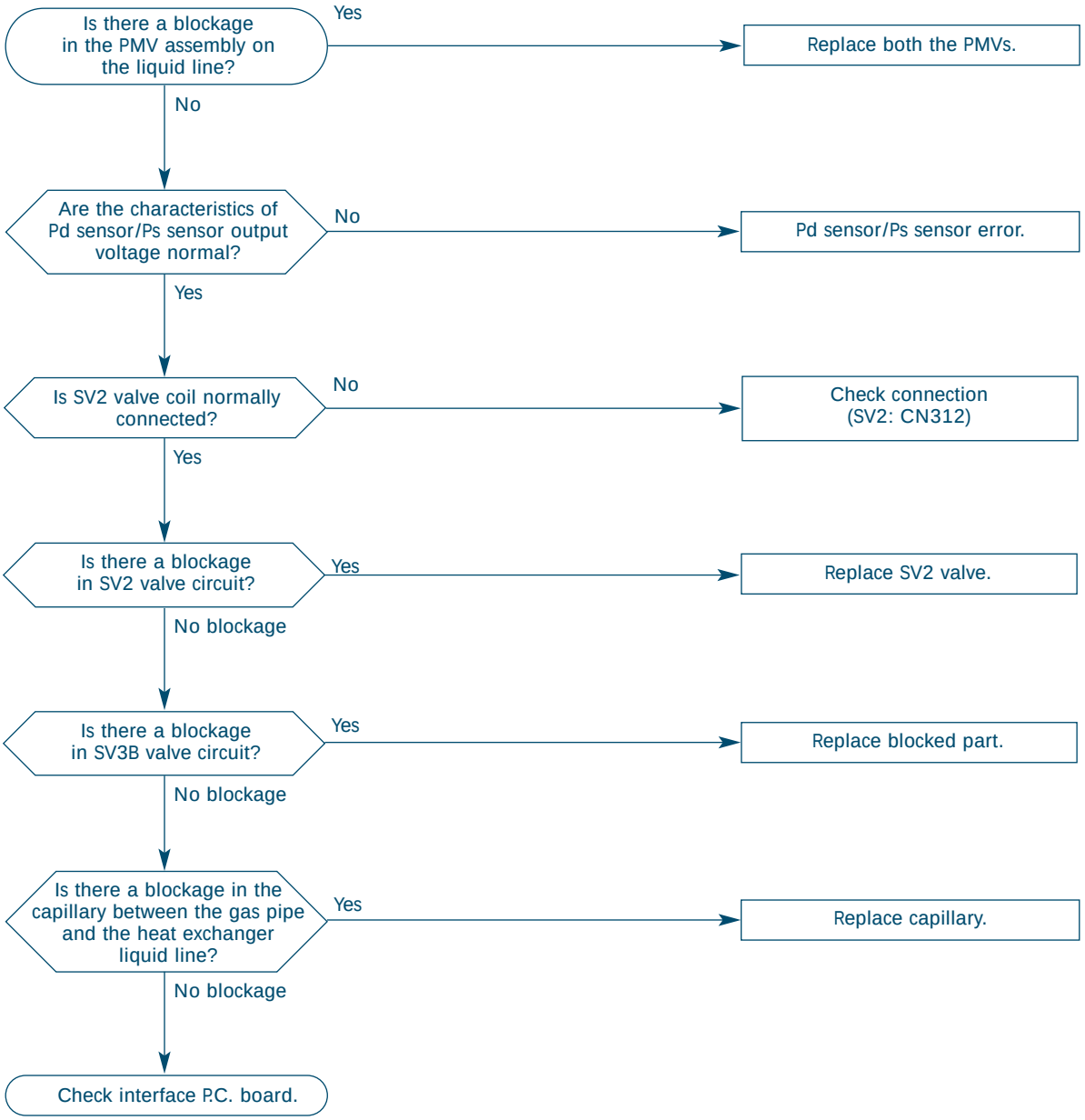
(*1) SV3C valve leakage check procedure

1. Remove SV3C coil and start a trial operation.
2. During operation, check the temperature at secondary side of SV3C valve (A).
   → If the temperature is high (equivalent to discharge temperature), leakage from SV3C valve is considered. **Replace SV3C valve.**



Diagnostic Procedure for Check Code

Check code	Operation cause
[dd] Outdoor refrigerant leakage detection	1. Leakage of PMV assembly on the liquid line 2. Pd sensor/Ps sensor error 3. Blockage in SV2 valve circuit 4. Blockage in SV3B valve circuit 5. Blockage in capillary of bypass between gas pipe and heat exchanger line


Is there a blockage in the PMV assembly on the liquid line?
Yes
Replace both the PMVs.
No
Are the characteristics of Pd sensor/Ps sensor output voltage normal?
No
Pd sensor/Ps sensor error.
Yes
Is SV2 valve coil normally connected?
No
Check connection (SV2: CN312)
Yes
Is there a blockage in SV2 valve circuit?
Yes
Replace SV2 valve.
No blockage
Is there a blockage in SV3B valve circuit?
Yes
Replace blocked part.
No blockage
Is there a blockage in the capillary between the gas pipe and the heat exchanger liquid line?
Yes
Replace capillary.
No blockage
Check interface P.C. board.

Diagnostic Procedure for Check Code

Check code	Operation cause
[dE] **Indoor address undefined**	1. Indoor unit in automatic addressing mode 2. Indoor unit P.C. board setup error 3. Defective indoor unit P.C. board 4. Communication noise interference

While this check code is displayed, wait for a moment. When the address is defined, the operation is automatically reset. However, if the check code does not disappear 20 minutes after the power source was turned on, a fault is considered. Check the following items.

- Fault check of indoor unit P.C. board
- Source check of communication noise interference
- Incorrect setup of jumper options on indoor unit P.C. board

Check code	Operation cause
[dF] **Outdoor address undefined**	1. Outdoor unit in automatic addressing mode 2. Defective indoor unit interface P.C. board 3. Communication noise interference

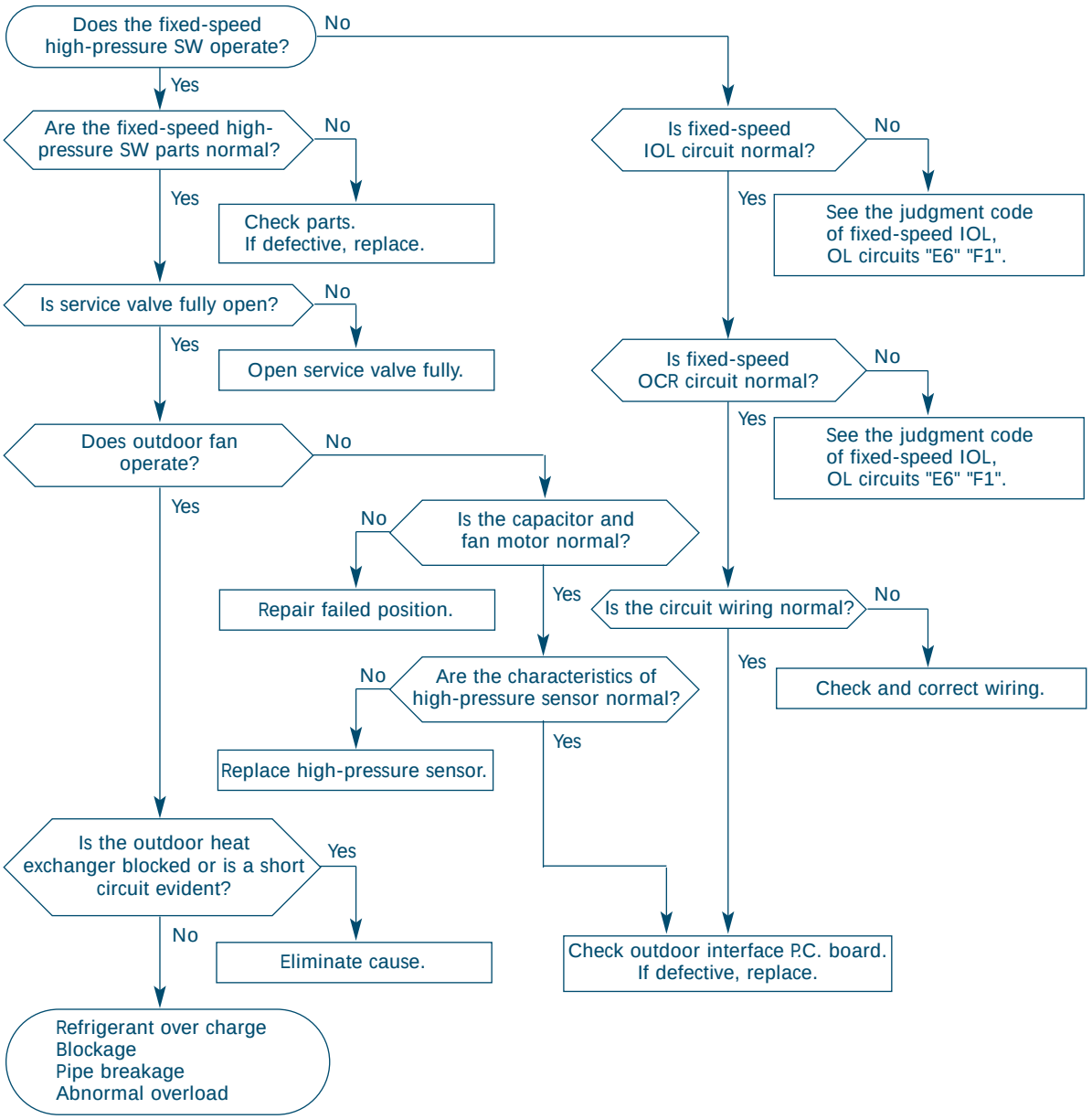
While this check code is displayed, wait for a moment. When the address is defined, the operation is automatically reset. However, if the check code does not disappear 20 minutes after the power source was turned on, a fault is considered. Check the following items.

- Fault check of outdoor unit interface P.C. board
- Source check of communication noise interference between outdoor units

Diagnostic Procedure for Check Code

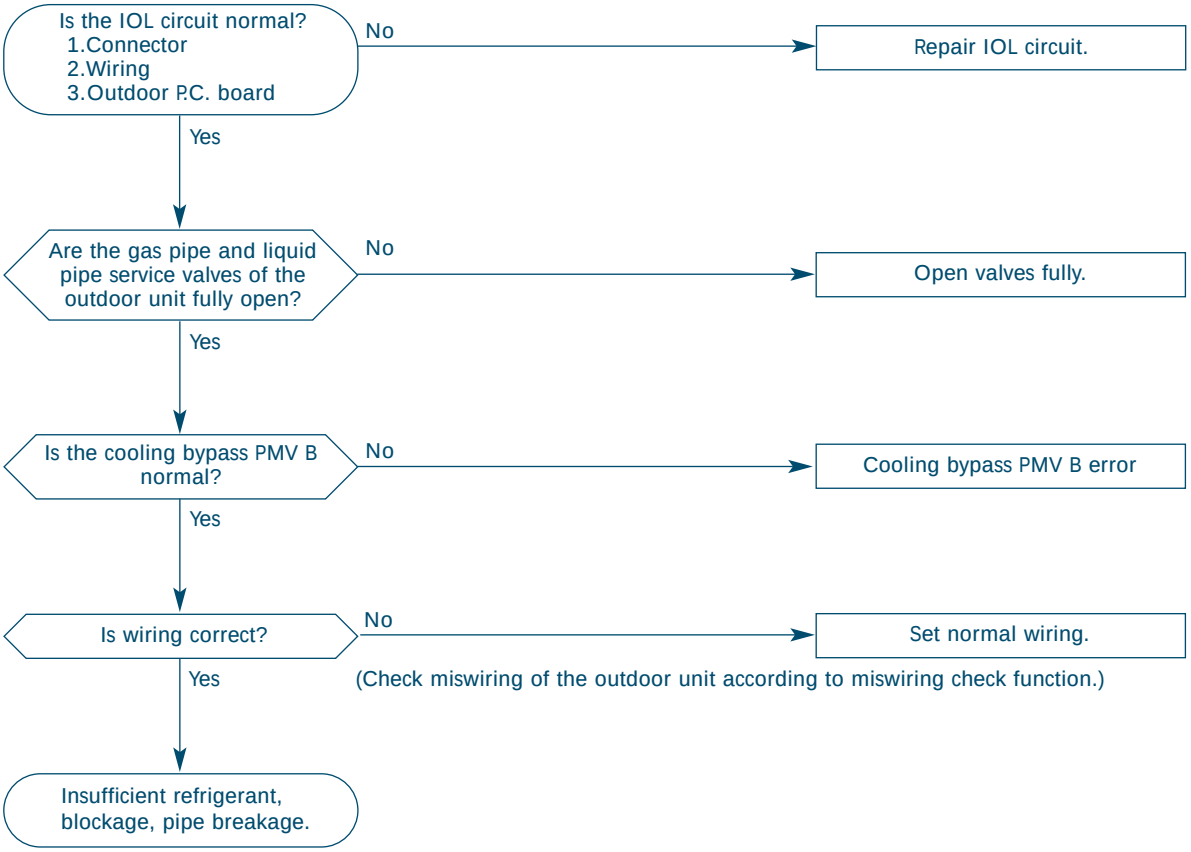
Check code	Operation cause
[E1] **Fixed-speed high-pressure SW system alarm (1)** **[F0]** **Fixed-speed high-pressure SW system alarm (2)**	1. Fixed-speed compressor high-pressure SW error 2. Fixed-speed compressor IOL operation 3. Service valve closed 4. Outdoor fan, capacitor error 5. Indoor/Outdoor PMV blockage 6. Outdoor heat exchanger blockage 7. SV2 circuit blockage 8. Miswiring of communication between indoor and outdoor units 9. Pd sensor error 10. Refrigerant over-charge

[E1]: High-pressure SW system error compressor 1 side
[F0]: High-pressure SW system error compressor 2 side



Diagnostic Procedure for Check Code

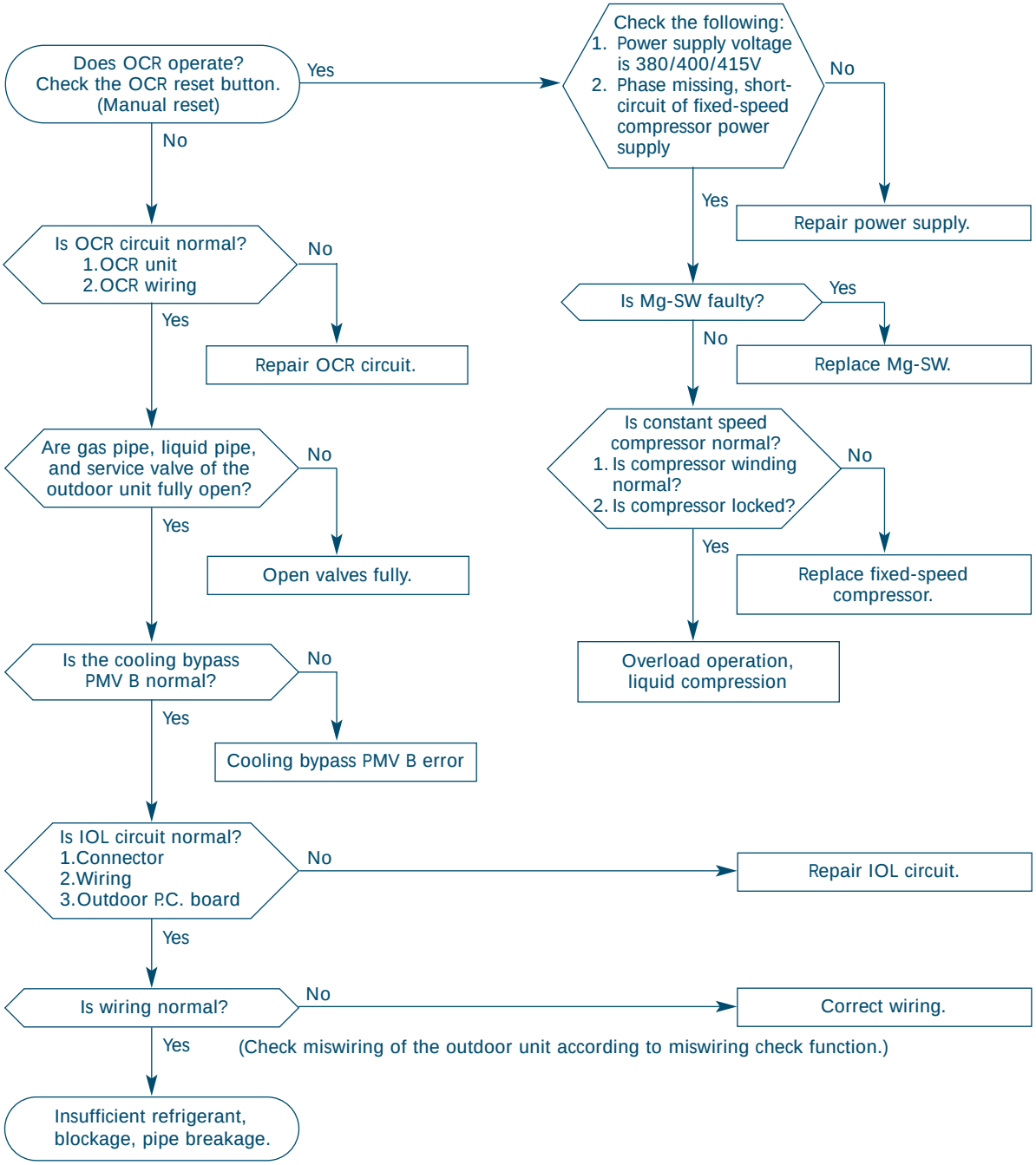
Check code	Operation cause
[E5] **Inverter IOL operation**	1. Inverter IOL operation 2. Service valve closed 3. Cooling bypass PMV error 4. Miswiring of communication between indoor and outdoor units



Diagnostic Procedure for Check Code

Check code	Operation cause
[E6] Fixed-speed IOL, OL system alarm (1) [F1] Fixed-speed IOL, OL system alarm (2)	1. Power supply error 2. Fixed-speed compressor IOL operation 3. Service valve closed 4. Blockage in indoor/outdoor PMV 5. Miswiring of communication between indoor and outdoor units

[E6]: IOL operation circuit error compressor 1 side
[F1]: IOL operation circuit error compressor 2 side

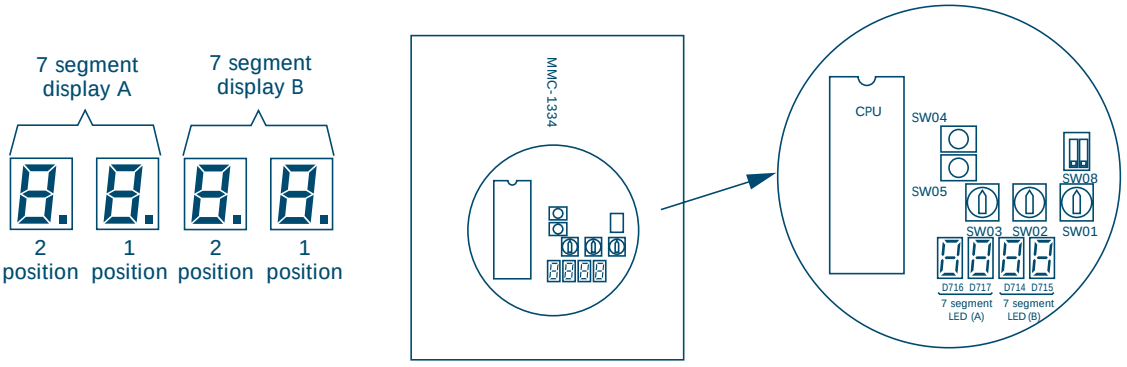


Diagnostic Procedure for Check Code

Segment Display Function

Outdoor unit 7 segment display (Interface P.C. board)

A 7 segment LED to check the operation status is provided on the interface control P.C. board. The display contents can be selected by combining the setup numbers of the rotary switches (SW01, SW02, and SW03) on the P.C. board.



Check Procedure when Emergency Stop has Occurred

When the system has stopped due to an error of the outdoor unit, check the following items.

(1) Remove lower painted panel and electrical cover on the inverter outdoor unit, and check the 7 segment display.
A check code is displayed at the right side of the 7 segment display.
[U1] [nn] (nn: Check code)
(Switch setup when checking the check code: SW01 [1], SW02 [1], SW03 [1])

(2) Confirm the check code, and implement check operation according to the Troubleshooting guide for each check code.

(3) If [U1] [d2] is displayed on the 7 segment display, an error occurs on the fixed-speed outdoor unit. Push the push-switch SW04 of the inverter outdoor unit for several seconds. Only the outdoor fan in which error occurred operates. Open the panel of the unit of which the fan operated, and check the code on the 7 segment display.

(4) Implement check operation according to the Troubleshooting guide for each check code.

Description of Functional Parts

Functional part		Functional outline	
Solenoid valve	1. SV3A (CN312)	1) Accumulates oil from the compressor to the oil tank when the valve is shut. 2) Supplies the gathered oil to the balancing pipe during ON time when pressure is applied to inside of the oil tank. 3) Supplies oil directly to the balancing pipe when the valve is open and pressure is applied. 4) Reduces pressure after pressure has been applied to inside of the oil tank.	
	2. SV3B (CN313)	1) Returns oil supplied in the balancing pipe to the compressor.	
	3. SV3C (CN314)	1) Applies pressure to inside the oil tank during ON time. 2) Detects oil level with temp. system.	
	4. SV2 (CN312)	(Hot gas bypass) 1) Low-pressure release valve. (To protect reduction of low pressure) 2) Protects liquid refrigerant gathering in accumulator. 3) Gas balancing in STOP time.	(Compressor case bypass) 1) Maintains oil viscosity.
	5. SV41/SV42 (CN311)	(Activation compensating valve for fixed-speed compressor) 1) For activation of gas balance. 2) Deflates gas in discharge pipe. (Protects liquid stagnation in discharge pipe.)	
Check valve	Check valve for discharge	1) Protects counter pressure when the inverter compressor is operating and the fixed speed compressor stops. 2) Decreases activation load when fixed-speed compressor is activated. (Shared function with SV41/SV42 valve)	
Pulse motor valve	1. PMVB	(Cooling bypass) (Connector CN302 Red) 1) Liquid bypass proportional control function for releasing discharge temperature 2) Releases low pressure.	
Oil separator		1) Early protection of oil level down (Decreases flow-out of discharge oil to cycle)	
Temp. sensor	1. TD1 (CN502) TD2 (CN503)	(TD1: Connector: Red, TD2: Connector: White) 1) Used to protect discharge temperature from the compressor. 2) Used to control cooling bypass for releasing discharge temperature.	
	2. TS1 (CN504)	(Connector: White) 1) Used to control cooling bypass for releasing discharge temperature.	
	3. TK1 (CN516) TK2 (CN515) TK3 (CN507)	(TK1: Connector: Black, TK2: Connector: Blue, TK3: Connector: Green) 1) Used to detect oil level judgment. (TK1, TK2) 2) Used to detect dilution status of oil. (TK3)	
	4. TE1 (CN505)	Used for fan control and to detect heat exchanger defrost requirement.	
Pressure sensor	1. High pressure sensor (CN501)	(Connector: Red) 1) Used to detect high pressure, and compressor capacity. 2) In cooling operation, it is used to detect high pressure, and control the fan in cooling low ambient conditions.	
	2. Low pressure sensor (CN500)	(Connector: Blue) 1) In cooling operation, it is used to detect low pressure, and control the capacity of the compressor. 2) Super-heat is controlled by monitoring low pressure during heating operation.	
Balancing pipe		1) Oil supply path for balancing oil of each outdoor unit. 2) Low-pressure bypass function between outdoor units, which recovers the liquid refrigerant stagnated in any stand-by outdoor unit. 3) Low-pressure balancing pipe function to secure pressure difference when check valve of every outdoor unit aligned on a circuit in parallel are inverted.	

Emergency Operation

When One Compressor has Failed (Backup Setup of Compressor)

Outline

When one of two compressors installed in the outdoor unit fails, take the following action if emergency operation by another normal compressor is possible.

*** NOTE 1:** In the case of single compressor installed unit (6HP), backup operation by one compressor is unavailable. In this instance refer to the “Emergency Operation when an outdoor unit has failed” section.

*** NOTE 2:** For the emergency operation when the failed compressor is an inverter, the capacity control is performed by ON/OFF control of fixed-speed compressor.

*** NOTE 3:** When motor winding of the compressor fails (Short, etc.), do not set backup of the compressor because deterioration of oil will occur.
(Another error in the outdoor unit may be caused.)

Work procedure

(1) First, **turn off the power source of all the outdoor units** which are connected to the system.
(2) The following works are performed to **the outdoor unit** of which the compressor failed. According to the following table, set DIP switch (SW06) on the interface P.C. board.

Table Switch setup in compressor backup

	SW06			
	Bit 1	Bit 2	Bit 3	Bit 4
Initial setup at shipment from factory	OFF	OFF	OFF	OFF
No.1 compressor (INV) (Front left compressor) has failed	ON	OFF	OFF	OFF
No.2 compressor (FIX) (Front right compressor) has failed	OFF	ON	OFF	OFF

(3) Backup setup is now complete. Turn on the power source of all the outdoor units.

When an Outdoor Unit has Failed

In this air conditioner, backup operation is permissible to both an inverter unit and a fixed-speed unit when an outdoor unit has failed.

In a system in which two or more outdoor units are connected, perform the emergency operation for failure of outdoor unit when alarm mode, such as one of the following cases, occurs.

(1) Fault of compressor (Short or when one compressor is not operating)
(2) Fault of pressure sensor (Pd, Ps)/fault of temp. sensor (TD1, TD2, TS, TE, TK1, TK2, TK3)
(3) Fault of refrigerating cycle parts, fan system parts, interface P.C. board, inverter P.C. board, electric part system, etc.

CAUTION: Emergency operation should only be completed on 1 outdoor unit per system.

Emergency Operation

Fault in fixed-speed unit (Backup of slave outdoor unit)

Outline

When a fixed-speed unit connected to the system fails, firstly perform emergency process according to the following work procedure, and then perform emergency operation on the inverter unit and other fixed-speed units.

Work procedure

(1) First, **turn off the power source of all the outdoor units** which are connected to the system.

(2) The following works are performed to **the failed fixed-speed unit**.
  1) **Close service valve of gas pipe fully** (fully close by turning clockwise).
  2) If refrigerant leakage occurs on PMVB, close service valve of the liquid pipes.
     (Fully close by turning clockwise)
  3) Check service valve of the balancing pipe is open fully (fully open by turning counterclockwise).
  4) [In case of fault of compressor/fault of electric part system]
     a. Works to the failed fixed-speed unit are complete.
     b. **Then, keep the power source OFF.**
  5) [In case of fault of other cycle part system]
     a. **Remove BUS-1 communication connector (BLU)[CN601] on the interface P.C. board.**
     b. Works to the failed fixed-speed unit are complete.
     c. **Then, turn on the power source to protect the compressor.**
        (Turn on crank case heater)

(3) Perform the following works **for the inverter unit**.
  1) Set **DIP SW 07/Bit 3 on the interface P.C. board to ON**.
     (Setup to correct oil recovery capacity)
  2) **Turn on the power source of each outdoor unit.**
  3) **Set operation permission of outdoor unit backup operation (alarm clear setup).**
     a. Set rotary switches on the interface P.C. board, SW03 to [No.1]/SW02 to [No.1]/SW01 to [No.1].
     b. After [U.][1][8][d] is displayed on the 7 segment LED of the interface P.C. board, set SW03 to [No.1]/SW02 to [No.16]/SW01 to [No.2].
     c. After [E.][r][ ][ ] is displayed on the 7 segment LED of the interface P.C. board, keep push-switch SW04 pushed for 5 seconds or more.
        [E.][r][C][L] is displayed on the 7 segment LED for 5 seconds, and work is complete.
     d. Set SW03 to [No.1]/SW02 to [No.1]/SW01 to [No.1].
        If [U.][1][ ][ ] is displayed on the 7 segment LED, it is normal.

(4) Then, emergency process is complete. The operation then starts by a command from the indoor unit.

Emergency Operation

Fault of inverter unit (Backup setup of Master outdoor unit)

Outline

When an inverter unit fails, firstly perform emergency process according to the following work procedure, and then perform emergency operation by a fixed-speed unit only.

Work procedure

(1) First, **turn off the power source of all the outdoor units** which are connected to the system.

(2) The following works are performed to **the failed inverter unit**.
- 1) **Close service valve of gas pipe fully.** (Fully close by turning clockwise)
- 2) If refrigerant leakage occurs on PMVB, close the service valve of the liquid pipe fully. (Fully close by turning clockwise)
- 3) Check **service valve of the balancing pipe is opened fully**. (Fully open by turning counterclockwise)
- 4) Remove "Short-circuit connector" connected to [CN604] on the interface P.C. board. The removed "Short-circuit connector" is used for the fixed-speed unit. (Described in item (4) below.)
- 5) [In case of fault of compressor/fault of electric part system]
  - a. Works to the failed inverter unit is complete.
  - b. **Then, keep the power source OFF**.
  - c. When central management remote controller is connected to the inverter unit, the central management remote controller cannot be used.
- 6) [In case of fault of other cycle part system]
  - a. Set **DIP SW06/Bit 1, 2, 3, 4 on the interface P.C. board to ON**. (LED display changes to U0)
  - b. Failed inverter work is complete.
  - c. **Then, turn on the power source to protect the compressor.** (Turn on winding heater)
  - d. The central management remote controller can be used as normal.

(3) **Select a master outdoor unit among the fixed-speed units according to the following reference.**
- 1) When only one fixed-speed unit is connected, select it as the master outdoor unit.
- 2) When two or more fixed-speed units are connected, select one connected to the nearest position of the inverter unit as the master outdoor unit.

(4) Perform the following works **for the fixed-speed unit selected as the master outdoor unit**.
- 1) Insert "Short-circuit connector" into [CN604] on the interface P.C. board. (One removed from the inverter unit as (2), 4))
- 2) Set **DIP SW07/Bit 3 on the interface P.C. board to ON**. (Setup to correct oil recovery capacity)
- 3) Set **DIP SW08/Bit 2 on the interface P.C. board to ON**. (Setup to select master outdoor unit)

(5) **Turn on the power source of each outdoor unit.**

(6) Emergency process is complete. The operation then starts by a command from the indoor unit.

Backup Operation

Emergency Operation

Outdoor backup setup in cooling season (Simple setting method)

Outline

When either inverter unit or fixed-speed unit fails during cooling season, this function is used to perform emergency operation quickly.

When the interface or electric circuit system fails, emergency operation by this setup cannot be performed. In this case, refer to “When outdoor unit has failed” section.

Work procedure

(1) First, **turn off the power source of all the outdoor units** which are connected to the system.

(2) The following works are performed to the **failed outdoor unit**.
(Even if the failed outdoor unit is the inverter unit or fixed-speed unit, the following works are common specifications.)
   1) Set **DIP SW06/Bit 1 and Bit 2 on the interface P.C. board to ON**.
   2) If refrigerant leakage occurred on PMVB, close the service valve of the liquid pipe fully. (Fully close by turning clockwise)

(3) **Turn on power source of each outdoor unit.**
If the fault is a compressor insulation error, etc., disconnect the lead wire of the compressor previously before work.

(4) Emergency process is complete. The operation then starts by a command from the indoor unit.

Forced Function of Oil Level Detection

Outdoor Unit

The oil level detection control can be forcibly implemented by a switch on the interface P.C. board of the outdoor unit. When an error in the oil tank circuit occurs and there is no cause such as sensor error, connection error, sensor location error, valve close operation error, etc., perform the following checks.

Oil tank circuit system error

Check code	Check code name	Judgment
d7	Low oil level detection protection	Oil level shortage status has been detected continuously for approx. 2 hours while oil equalising control was continuously implemented.
d8	TK1 temp. detection circuit alarm	Temp. change at the oil tank primary side was not detected while oil level detection control was implemented.
d9	TK2 temp. detection circuit alarm	Temp. change at the oil tank secondary side was not detected while oil level detection control was implemented.
db	Oil level detection circuit blockage detection	Temp. change at both the oil tank primary side and secondary side was not detected while oil level detection control was implemented.
dC	Oil level detection circuit	The status of TK1 temp. is high (50°C or more) and was continuously detected.

Operation procedure

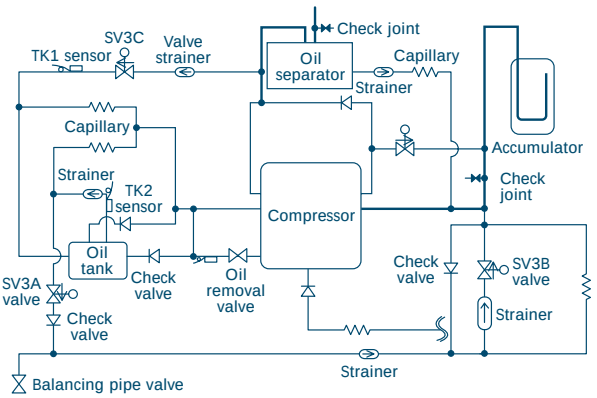
1) Start the trial operation after alarm was cleared.
2) Set SW01/SW02/SW03 on the interface P.C. board of the outdoor unit to 1/16/1 respectively, for detection of oil level.
3) Push the push-switch SW04 for 2 seconds.
4) Check the 7 segment display on the P.C. board.

	7 segment display
Operation starts →	[OL] [– –]
During operation →	Counted down every 10 seconds from [OL] [1F]
Oil level detection control starts →	[OL] [FF]
During oil level detection counting →	Counted up every 1 second from [OL] [01]
Oil level judgment result	[OL] [A0] [A1] [A2] [A3] [A4]

Oil level judgment result

Result	Judgment
[A0]	Oil amount in the compressor is adequate. Check that the operation continues and there is no problem. If [dC] occurred, execute check even if oil level was judged as adequate.
[A1]	Oil level was judged as shortage. If this judgment continues, the system stops for protection. When [d7], [dC] occurred, check according to the check items.
[A2]	TK1 temp. detection was judged as an error. If this judgment continues, the system stops for protection. When [d8] occurred, check according to the check items.
[A3]	Oil level detection circuit (SV3C valve) was judged as blockage. If this judgment continues, the system stops for protection. When [db] occurred, check according to the check items.
[A4]	TK2 temp. detection was judged as an error. If this judgment continues, the system stops for protection. When [d9] occurred, check according to the check items.

Peripheral circuits of oil tank



Leak Test

[1] Leak test pressure

For Multi Modular System air conditioner systems: 3.0MPa (30kg/cm²G)

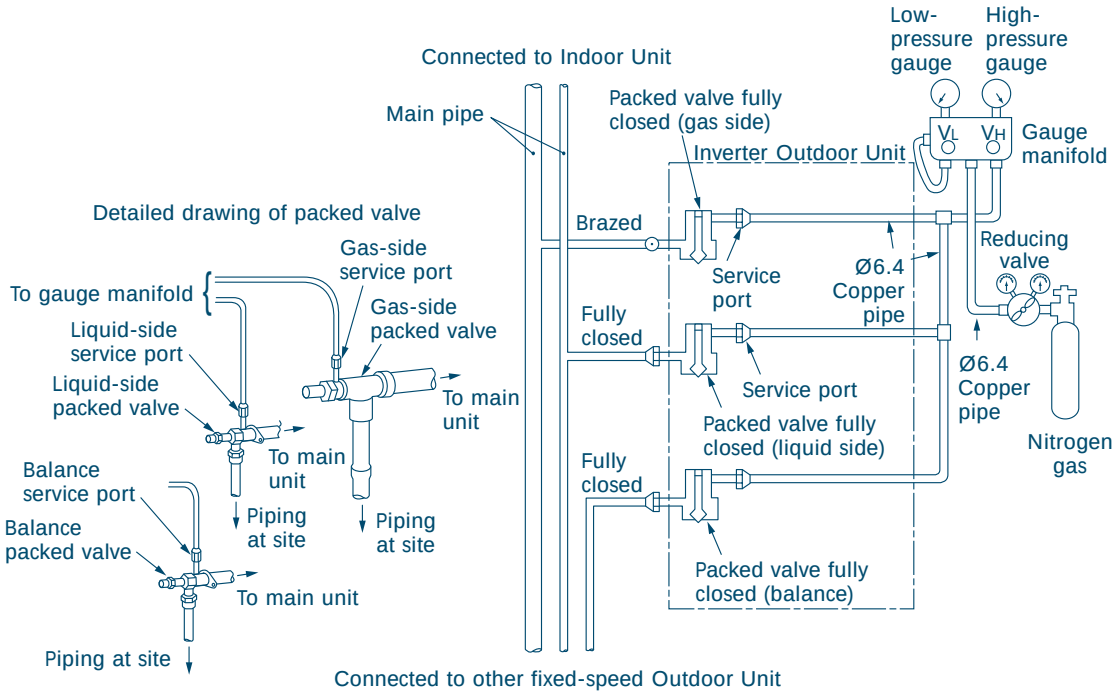
[2] Test method

Supply oxygen free nitrogen (OFN) gas to the system as described.

- The gas-side, liquid-side and balance valves must all be fully closed.
  Note that there is a possibility that the nitrogen gas could become mixed into the outdoor unit cycle. Therefore, re-tighten the valves (gas-side, liquid-side and balance) before applying pressure.

CAUTION:

Never use oxygen, a flammable gas, or a toxic gas for leak tests.
Apply pressure gradually in the prescribed steps for the gas, liquid and the balance sides for each individual refrigerant system.
Ensure pressure is applied.



STEP 1 : 0.3MPa (3.0kg/cm²G) Apply pressure for at least 3 minutes.
STEP 2 : 1.5MPa (15.0kg/cm²G) Apply pressure for at least 3 minutes.
STEP 3 : 3.0MPa (30.0kg/cm²G) Apply pressure for 24 hours. This step permits detection of slow leaks.

Check for any loss of pressure.
No loss of pressure: Pass
Loss of pressure: Check for location of leak

(Ensure you allow for any change in ambient temperature when the pressure was initially applied and the temperature 24 hours later. The pressure will change by approx. 0.01MPa (0.1kg/cm² G) per 1°C.)

NOTES:

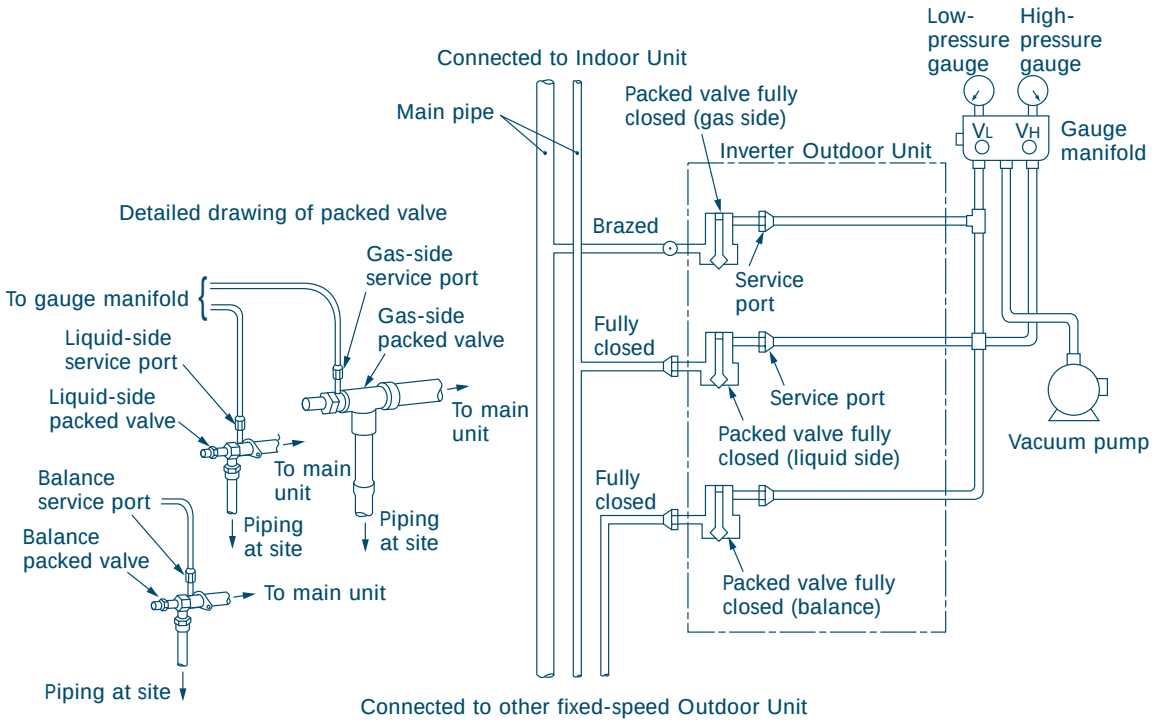
If piping is long, an airtight test is performed for each divided block.
1) Indoor side + vertical pipe 2) Indoor side + vertical pipe + outdoor side

[3] Leaked position check

When a reduction in pressure is detected in STEPS 1 to 3, check for leakage at connecting points. Check leakage with foaming agent, etc., and perform re-brazing or re-tightening of flare if leakage is detected.

Vacuuming

(1) After the airtight test, discharge nitrogen gas.
Connect a gauge manifold to the service ports at liquid, gas and balance sides, and connect a vacuum pump as shown in the following figure.
Be sure to perform vacuuming at liquid, gas, and balance sides.



(2) Use a vacuum pump with a large displacement so that the vacuum will achieve below 0.750mmHg.
(3) Perform vacuuming for 2 or 3 hours, though time requirement differs due to pipe length. During this time, check that all packed valves at liquid, gas, and balance sides are fully closed.
(4) If vacuuming does not reach 0.750mmHg or below even after vacuuming for 2 hours or more, perform vacuuming for a futher hour.
If vacuuming still does not reach 0.750mmHg after 3 hours, check for leakage.
(5) When vacuuming reaches 0.750mmHg or below after vacuuming, fully close valves.
Close V_L and V_H on the gauge manifold fully, stop the vacuum pump. After 1 hour check the vacuum gauge reading has not change. If there is a change, there may be a leak. Check for leak.
(6) After the above procedure of vacuuming has completed, replace the vacuum pump with a refrigerant cylinder, and advance to additional refrigerant charging work.

Charging the System with Additional Refrigerant

Calculating the Amount of Additional Refrigerant Required

Refrigerant in the System When Shipped from the Factory

Outdoor unit Model	MM-A0224HT	MM-A0280HT	MM-A0160HX	MM-A0224HX	MM-A0280HX
Charging amount (kg)	15.5	17.0	5.0	7.0	9.0

When the system is charged with refrigerant at the factory, the amount of refrigerant needed for the pipes at the site is not included. Calculate the additional amount needed, and add that amount to the system.

Calculation

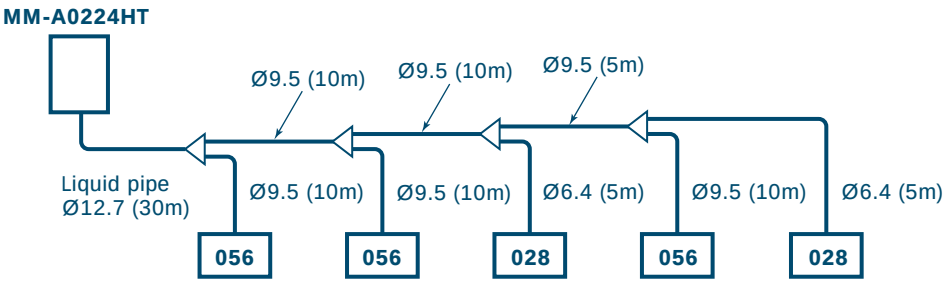
Calculate the additional refrigerant to be added to the system on the basis of the size of the liquid-side pipes in use at the site, and their length.

Refrigerant to be added at site =
(length of liquid-side pipe) x (additional amount of refrigerant per meter of liquid-side pipe)

Additional refrigerant R (kg) = (L1 x 0.030kg/m)

L_1: Total length (m) of 6.4mm-diameter liquid-side pipe
L_2: Total length (m) of 9.5mm-diameter liquid-side pipe
L_3: Total length (m) of 12.7mm-diameter liquid-side pipe
L_4: Total length (m) of 15.9mm-diameter liquid-side pipe
L_5: Total length (m) of 19.0mm-diameter liquid-side pipe
L_6: Total length (m) of 22.2mm-diameter liquid-side pipe

Example of calculation

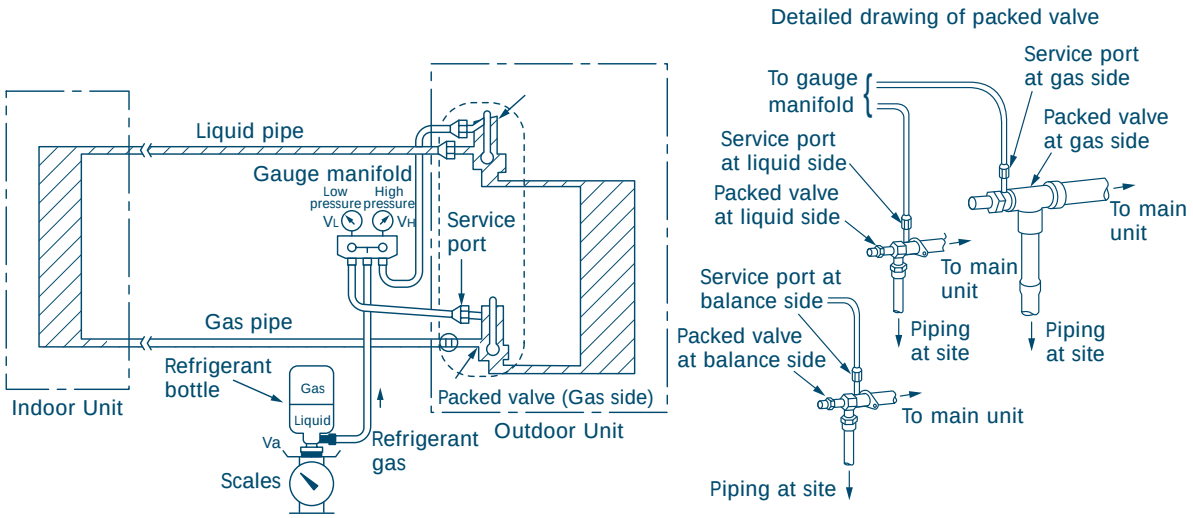


Liquid pipe:

Ø6.4 = 5 + 5 = 10m
Ø9.5 = 10 + 10 + 10 + 10 + 4 + 10 = 54m
Ø12.7 = 30m
R = (10m x 0.030kg/m) + (54m x 0.065kg/m) + (30m x 0.115kg/m) = 7.26kg

Additional Refrigerant Charging Method

(1) Loosely connect the refrigerant cylinder hose to the gauge manifold, then open the source valve V_H on the cylinder, purge the air in the hose, and then tighten the hose.
(2) As shown in the diagram below, turn the refrigerant cylinder upside down, open the valve V_H on the gauge manifold, and then charge the liquid side pipe with refrigerant in the liquid state. (Note that with some types of refrigerant cylinders, the liquid refrigerant will be output through siphoning action with the cylinder in the normal upright position.) If the proper charging amount cannot be reached, close the valve V_H, turn the refrigerant cylinder upright, open the liquid-side and balance packed valves completely, and open the gas-side packed valve only half way. Begin the cooling operation, open valve V_L, and then charge the gas-side pipe with refrigerant in the gaseous state.
(3) While watching the scales display, quickly close the valve V_L completely when the system has been charged with the proper amount of additional refrigerant. Then close the source valve Va on the cylinder, and open the gas-side packed valve completely.
(4) Record the amount of additional refrigerant that was added to the system on the nameplate inside the front panel (lower) of the outdoor unit.



Additional Refrigerant Charging

Additional refrigerant charging amount reference chart

Unit (kg)

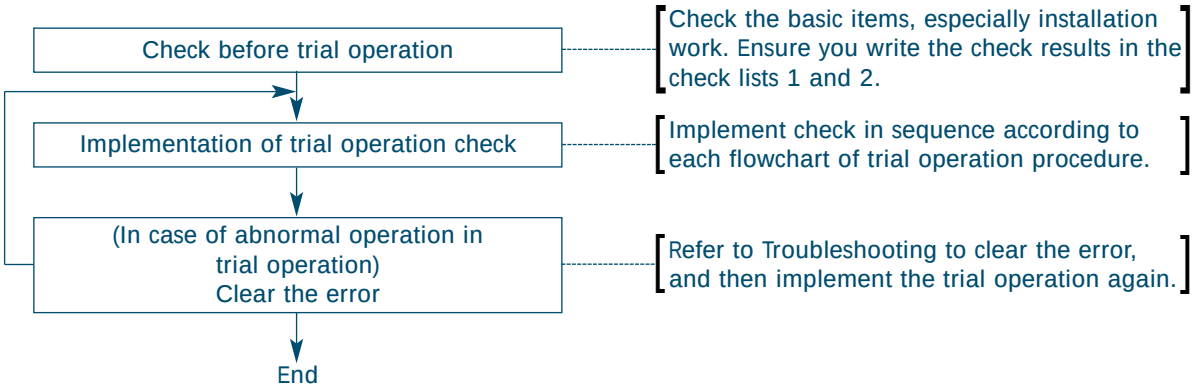
Actual piping length (m)	Pipe size (Liquid pipe)					
	Ø6.4	Ø9.5	Ø12.7	Ø15.9	Ø19.0	Ø22.2
1	0.030	0.065	0.115	0.190	0.290	0.420
2	0.060	0.130	0.230	0.380	0.580	0.840
3	0.090	0.195	0.345	0.570	0.870	1.260
4	0.120	0.260	0.460	0.760	1.160	1.680
5	0.150	0.325	0.575	0.950	1.450	2.100
6	0.180	0.390	0.690	1.140	1.740	2.520
7	0.210	0.455	0.805	1.330	2.030	2.940
8	0.240	0.520	0.920	1.520	2.320	3.360
9	0.270	0.585	1.035	1.710	2.610	3.780
10	0.300	0.650	1.150	1.900	2.900	4.200
11	0.330	0.715	1.265	2.090	3.190	4.620
12	0.360	0.780	1.380	2.280	3.480	5.040
13	0.390	0.845	1.495	2.470	3.770	5.460
14	0.420	0.910	1.610	2.660	4.060	5.880
15	0.450	0.975	1.725	2.850	4.350	6.300
16	0.480	1.040	1.840	3.040	4.640	6.720
17	0.510	1.105	1.955	3.230	4.930	7.140
18	0.540	1.170	2.070	3.420	5.220	7.560
19	0.570	1.235	2.185	3.610	5.510	7.980
20	0.600	1.300	2.300	3.800	5.800	8.400
21	0.630	1.365	2.415	3.990	6.090	8.820
22	0.660	1.430	2.530	4.180	6.380	9.240
23	0.690	1.495	2.645	4.370	6.670	9.660
24	0.720	1.560	2.760	4.560	6.960	10.080
25	0.750	1.625	2.875	4.750	7.250	10.500
26	0.780	1.690	2.990	4.940	7.540	10.920
27	0.810	1.755	3.105	5.130	7.830	11.340
28	0.840	1.820	3.220	5.320	8.120	11.760
29	0.870	1.885	3.335	5.510	8.410	12.180
30	0.900	1.950	3.450	5.700	8.700	12.600

Actual piping length (m)	Pipe size (Liquid pipe)					
	Ø6.4	Ø9.5	Ø12.7	Ø15.9	Ø19.0	Ø22.2
31	0.930	2.015	3.565	5.890	8.990	13.020
32	0.960	2.080	3.680	6.080	9.280	13.440
33	0.990	2.145	3.795	6.270	9.570	13.860
34	1.020	2.210	3.910	6.460	9.860	14.280
35	1.050	2.275	4.025	6.650	10.150	14.700
36	1.080	2.340	4.140	6.840	10.440	15.120
37	1.110	2.405	4.255	7.030	10.730	15.540
38	1.140	2.470	4.370	7.220	11.020	15.960
39	1.170	2.535	4.485	7.410	11.310	16.380
40	1.200	2.600	4.600	7.600	11.600	16.800
41	1.230	2.665	4.715	7.790	11.890	17.220
42	1.260	2.730	4.830	7.980	12.180	17.640
43	1.290	2.795	4.945	8.170	12.470	18.060
44	1.320	2.860	5.060	8.360	12.760	18.480
45	1.350	2.925	5.175	8.550	13.050	18.900
46	1.380	2.990	5.290	8.740	13.340	19.320
47	1.410	3.055	5.405	8.930	13.630	19.740
48	1.440	3.120	5.520	9.120	13.920	20.160
49	1.470	3.185	5.635	9.310	14.210	20.580
50	1.500	3.250	5.750	9.500	14.500	21.000
51	1.530	3.315	5.865	9.690	14.790	21.420
52	1.560	3.380	5.980	9.880	15.080	21.840
53	1.590	3.445	6.095	10.070	15.370	22.260
54	1.620	3.510	6.210	10.260	15.660	22.680
55	1.650	3.575	6.325	10.450	15.950	23.100
56	1.680	3.640	6.440	10.640	16.240	23.520
57	1.710	3.705	6.555	10.830	16.530	23.940
58	1.740	3.770	6.670	11.020	16.820	24.360
59	1.770	3.835	6.785	11.210	17.110	24.780
60	1.800	3.900	6.900	11.400	17.400	25.200

Procedure and Summary of Trial Operation

Outline of procedure

For a trial operation, follow the procedure below.


Check before trial operation
Check the basic items, especially installation work. Ensure you write the check results in the check lists 1 and 2.
Implementation of trial operation check
Implement check in sequence according to each flowchart of trial operation procedure.
(In case of abnormal operation in trial operation)
Clear the error
Refer to Troubleshooting to clear the error, and then implement the trial operation again.
End

* Ensure you write the check results of trial operation in the check lists 1 and 2. It will be an important document for servicing or maintenance in the future.

Check before trial operation

Prior to the trial operation, confirm whether there is a fault with the installation work using "Check list 1".

CHECK LIST 1

Is the capacity of field fuse adequate?		Outdoor unit ☐ A	Indoor unit ☐ A	
Is the dia. of power source cable correct?		Outdoor unit ☐ mm²	Indoor unit ☐ mm²	
Is the control transmission line correct?	(Indoor/Outdoor connecting terminal: PQ, Type: Shield wire)	Cable dia. ☐ mm²		
Is the power of indoor units collectively supplied?				
Is the earth grounded?				
Is the insulation good?	(10MΩ or more)	☐ MΩ or more		
Is the voltage good?	(Within 380/400/415V±10%)	☐ V for outdoor unit		
Is the connecting cable dia. correct				
Is the branching kit correct?				
Is the drain water flow sufficient?		(Indoor unit)		
Is the heat insulation of cables good?		(Connecting cables, branching kits)		
Is there no short-circuit of discharge air of indoor/outdoor units?				
Are vacuuming and addition of refrigerant performed after airtight test of cables?				
Are the valves fully opened?	Gas side ☐	Liquid side ☐	Balance side ☐	

Check additional amount of refrigerant.

CHECK LIST 2

- Calculate the additional amount of refrigerant from the pipe dia. at liquid side and length of pipe to be connected. Write the total length of the liquid side pipes for each dia. in the following table, and calculate the additional amount of refrigerant. (The refrigerant amount charged in the outdoor unit is only for the outdoor unit, and refrigerant for piping is not included.)

Pipe dia. at liquid side	Standard refrigerant amount (kg/m)		Total length of liquid side pipes (m)	Additional refrigerant amount for each liquid pipe
Ø6.4	0.030	X	=	kg
Ø9.5	0.065	X	=	kg
Ø12.7	0.115	X	=	kg
Ø15.9	0.190	X	=	kg
Ø19.0	0.290	X	=	kg
Ø22.2	0.420	X	=	kg
			Additional refrigerant amount	kg

Procedure and Summary of Trial Operation

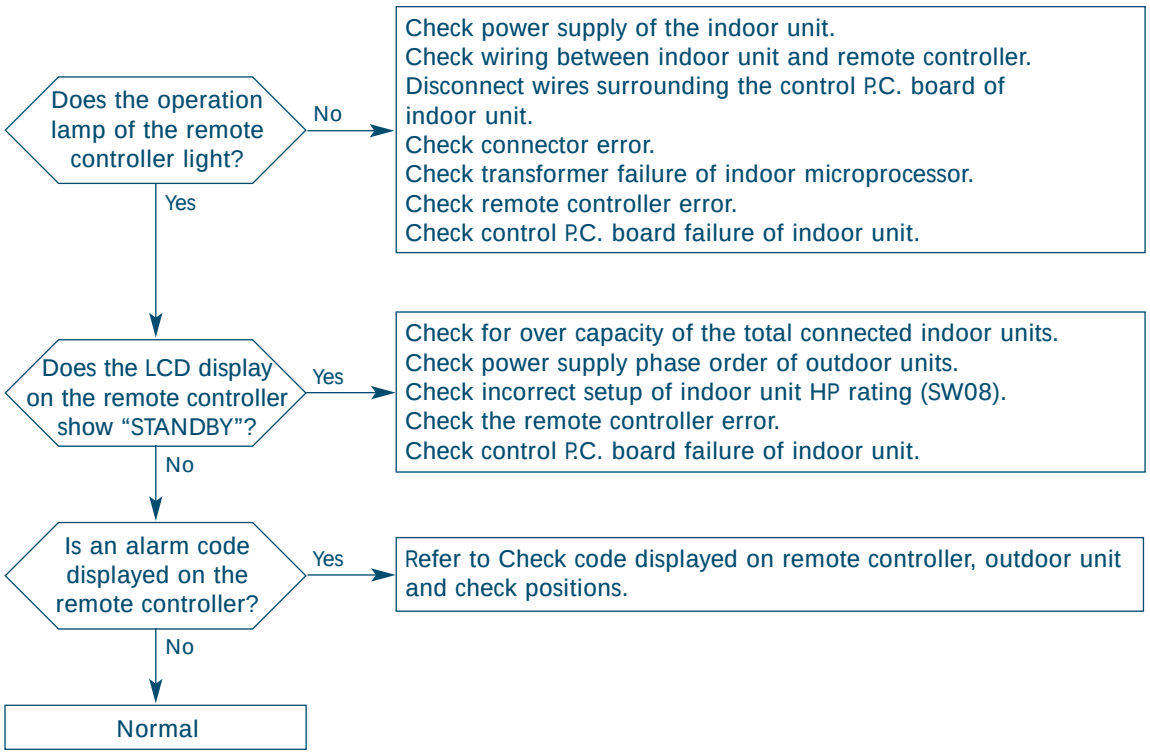
Trial operation check

After “Check before trial operation”, implement a trial operation in the following procedure. (Turn the power switch on and the crank case heater for 12 hours before a trial operation will be completed.)

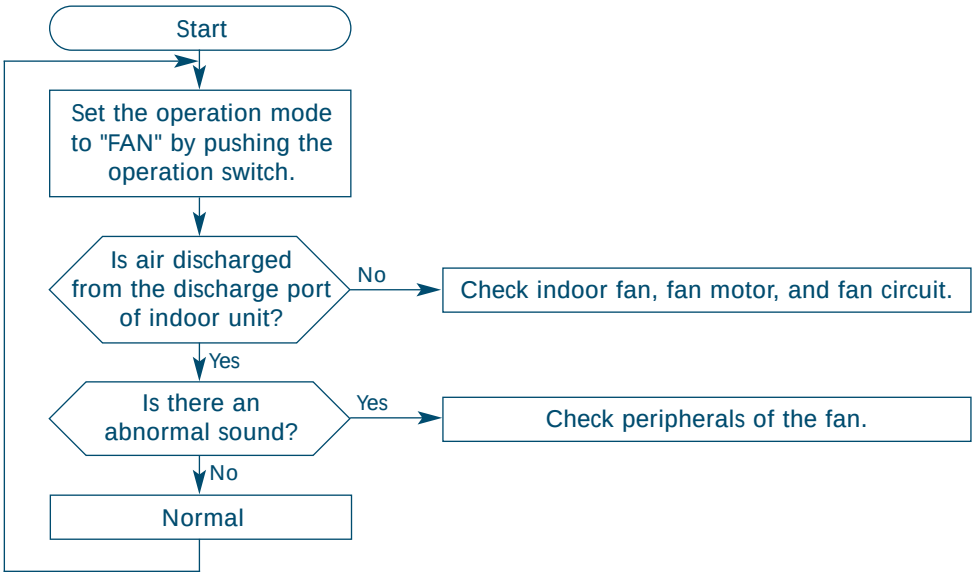
Check the trial operation for each indoor unit. When multiple indoor units are concurrently operated check for misconnection, etc. of the refrigerant pipe and control wiring, errors can occur. Therefore, set “STOP” for indoor units.

Flowchart of trial operation procedure

(1) Power source and initial setup check


Does the operation lamp of the remote controller light?
No
Check power supply of the indoor unit.
Check wiring between indoor unit and remote controller.
Disconnect wires surrounding the control P.C. board of indoor unit.
Check connector error.
Check transformer failure of indoor microprocessor.
Check remote controller error.
Check control P.C. board failure of indoor unit.
Yes
Does the LCD display on the remote controller show “STANDBY”?
Yes
Check for over capacity of the total connected indoor units.
Check power supply phase order of outdoor units.
Check incorrect setup of indoor unit HP rating (SW08).
Check the remote controller error.
Check control P.C. board failure of indoor unit.
No
Is an alarm code displayed on the remote controller?
Yes
Refer to Check code displayed on remote controller, outdoor unit and check positions.
No
Normal

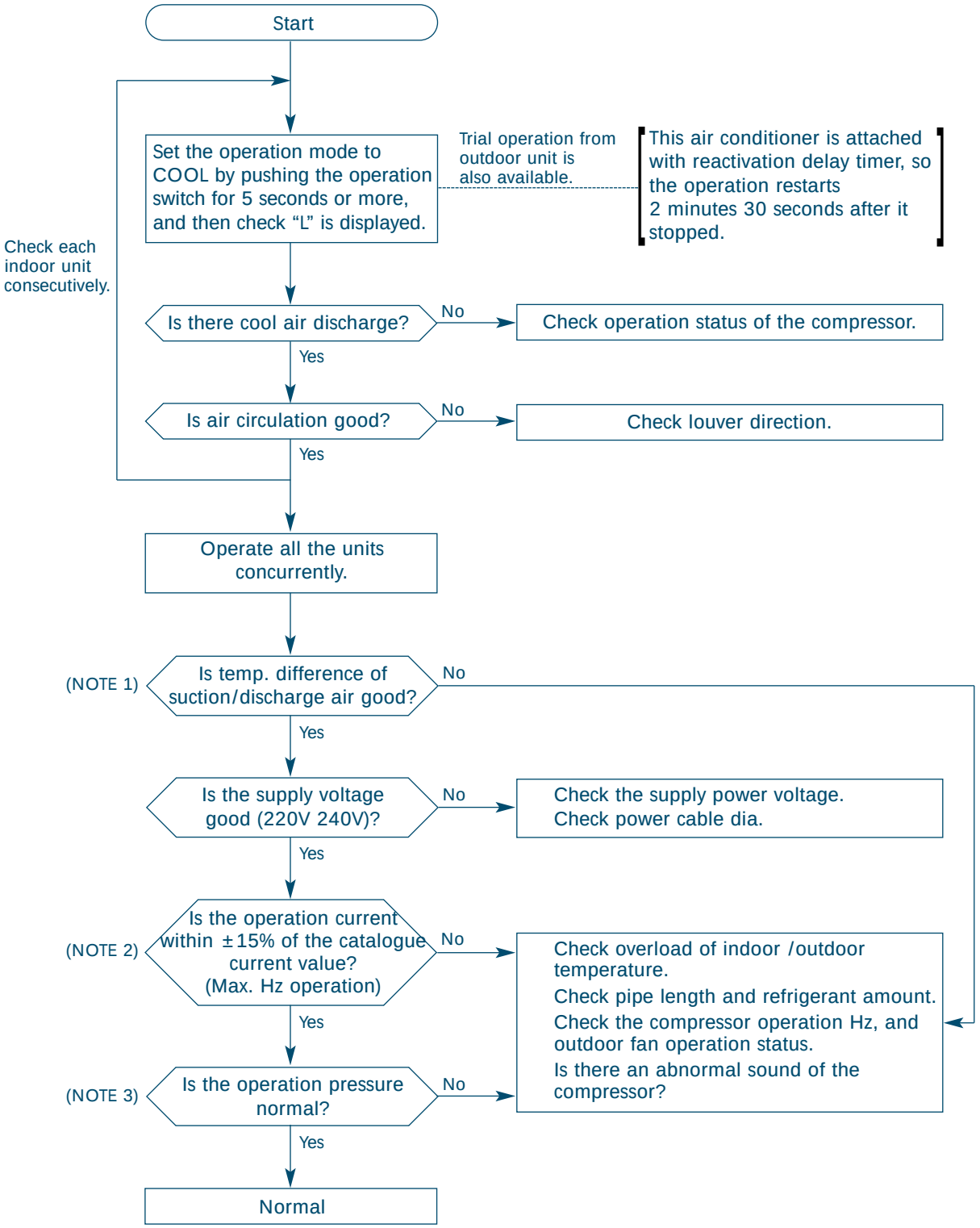
(2) Fan operation check


Start
Set the operation mode to "FAN" by pushing the operation switch.
Is air discharged from the discharge port of indoor unit?
No
Check indoor fan, fan motor, and fan circuit.
Yes
Is there an abnormal sound?
Yes
Check peripherals of the fan.
No
Normal

Check each indoor unit consecutively.

Procedure and Summary of Trial Operation

(3) Cooling operation check


Start
Set the operation mode to COOL by pushing the operation switch for 5 seconds or more, and then check "L" is displayed.
Trial operation from outdoor unit is also available.
This air conditioner is attached with reactivation delay timer, so the operation restarts 2 minutes 30 seconds after it stopped.
Check each indoor unit consecutively.
Is there cool air discharge?
No
Check operation status of the compressor.
Yes
Is air circulation good?
No
Check louver direction.
Yes
Operate all the units concurrently.
(NOTE 1)
Is temp. difference of suction/discharge air good?
No
Yes
Is the supply voltage good (220V 240V)?
No
Check the supply power voltage.
Check power cable dia.
Yes
(NOTE 2)
Is the operation current within ±15% of the catalogue current value? (Max. Hz operation)
No
Check overload of indoor /outdoor temperature.
Check pipe length and refrigerant amount.
Check the compressor operation Hz, and outdoor fan operation status.
Is there an abnormal sound of the compressor?
Yes
(NOTE 3)
Is the operation pressure normal?
No
Yes
Normal

Procedure and Summary of Trial Operation

NOTE 1: **Criteria for indoor air inlet/outlet temperature difference**

After operation for a minimum of 30 minutes in “COOL” mode, if temp. difference between the air inlet and air outlet of the indoor unit is 8°C or more – operation is normal.
(In Max. Hz operation)

- The difference in temperature between the air inlet and air outlet decreases when the total number of indoor units connected, exceeds 100% of the system capacity, or when the pipe length exceeds specification.

NOTE 2: **Criteria of operation current value**

In cooling operation, when the current is within ± 15% of the specified current value, the system is operating normally.
(COOL Max. Hz operation)

The current value differs as described below according to the operation conditions.

- Greater than the specified current
  (1) Temp. in indoor/outdoor is high.
  (2) Radiation of outdoor unit is bad.
- Less than the specified current
  (1) Temp. in indoor/outdoor is low.
  (2) Gas leakage. (Insufficient refrigerant amount)

NOTE 3: **Criteria of operation pressure**

COOL/ HEAT	High pressure 16 to 22kgf/cm^{2}G	Indoor 18 to 32°C Outdoor 25 to 35°C
	Low pressure 3.5 to 5.5kgf/cm^{2}G	

NOTE: Measurement taken 15 minutes after operation start (Dry bulb temp. °C)

Automatic Address

Automatic address (Between outdoor unit and indoor unit)

When turning the power on for the first time after the air conditioner has been installed, automatic address starts.

Usually, the automatic address takes time approx. 3 to 5 minutes after the power is on. However, in some cases, it may take Max. 20 minutes.

Cautions during automatic addressing

1. The air conditioner cannot be operated.
   If pushing the operation button during automatic addressing, the following will occur.
   (1) The operation lamp of the remote controller lights.
   (2) Indoor unit fan starts or stops according to the operation mode.
   (3) The outdoor unit is in 'stop' status.
   Therefore, cool air does not discharge from indoor unit.
   After automatic address is over, the above condition is released, and normal operation starts automatically.
2. Miswiring check causes misjudgment of automatic addressing
   If miswiring is found during automatic addressing, the result is incorrect addressing. Therefore, check miswiring 20 minutes or more after power was turned on.
3. **When control address of the indoor unit has been fixed, the automatic address is not activated.**
   However, the automatic address is activated again in the following cases.
   (1) When replacing P.C. board of the indoor unit, and power is turned on for the first time.
   (2) When adding a new indoor unit, and power is turned on for the first time.

Service Support Function

Check function for connection of refrigerant pipe and control transmission line

This function is provided to check misconnection of the refrigerant piping and the control transmission line between indoor and outdoor units by the switch on interface P.C. board of the inverter type outdoor unit.

However, be sure to check items described below before implementing this check function.

1. **When group operation of the remote controller is performed and the connected outdoor units are used, check function does not work.**
2. **Use this check system to check lines one by one in single outdoor unit. If checking multiple lines at the same time, error may occur.**

Check Procedure

Power ON → Both outdoor/indoor unit sides

System capacity check
Set SW01 on the interface P.C. board of the inverter outdoor unit to "1", SW02 to "2", and SW03 to "3" .The system capacity is displayed on the 7 segment LED [A]. Check that this display is consistent with the expected system capacity.

Check No. of outdoor units
Set SW01 on the interface P.C. board of the inverter outdoor unit to 1, SW02 to 3, and SW03 to 3. The No. of outdoor units (including inverter unit)connected to the system is displayed on the 7 segment LED [A]. Check that this display agrees with the expected No. of outdoor units.

Check No. of indoor units
Set SW01 on the interface P.C. board of the inverter outdoor unit to 1, SW02 to 4, and SW03 to 3. The No. of indoor units connected to the system is displayed on the 7 segment LED [A]. Check that this display is consistent with the expected No. of the indoor units.

Set the switch on the interface P.C. board of the inverter outdoor unit to the following value.
SW01 to 2, SW02 to 1, SW03 to 1: Cooling operation

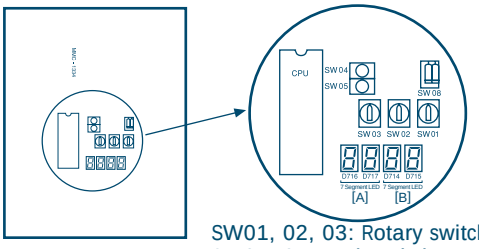
Push the push-switch SW04 on the interface P.C. board of the inverter outdoor unit for 2 seconds or more. Check that display of the 7 segment LED [B] is CC in cooling operation.

→ Operation

After 15 minutes, check the 7 segment LED [B] display which will be the No. of indoor units misconnected. (If no unit is misconnected, 00 is displayed. *1)
Then, check the check code by setting SW01 to 5, SW02 and SW03 in order of address (*2). If any switch is set to address of the misconnected indoor unit, 9A is displayed on 7 segment LED [B].

After check, return display select switches SW01, SW02, and SW03 on the interface P.C. board of the inverter outdoor unit to 1.

→ Completion



SW01, 02, 03: Rotary switch
SW04, 05: Push switch
SW08: Dip switch

It takes 15 minutes for 1 system to check if it is correct or miswired.

*1 In No. of units displayed on the 7 segment, No. of indoor units which send the check code are also counted other then No. of miswired units, so check the check code.

*2

SW02	SW03	Address of indoor unit Displayed on 7 segment LED [A]
1 to 16	1	1 to 16
1 to 16	2	17 to 32
1 to 16	3	33 to 40

Service Support Function

Function to start/stop (ON/OFF) indoor unit from outdoor unit

A function to start/stop the following indoor units by switch operation on the interface P.C. board is provided.

No.	Function	Outline	Clear setup
(1)	Trial cooling operation	The modes of all the connected indoor units are collectively changed to trial cooling operation modes. **NOTE:** Control operation is the same as that of normal trial operation from the remote controller.	[Setup] Push SW04 for 2 seconds or more under condition of SW01 “2”, SW02 “5”, SW03 “1”. [Clear] Returns SW01, SW02 and SW03 to “1”.
(2)	Collective operation	All the connected indoor units are operated collectively. **NOTE:** Operation contents match the setup on the remote controller.	[Setup] Push SW04 for 2 seconds or more under condition of SW01 “2”, SW02 “7”, SW03 “1”. [Clear] Returns SW01, SW02 and SW03 to “1”.
	Collective stop	All the connected indoor units are stopped collectively.	[Setup] Push SW05 for 2 seconds or more under condition of SW01 “2”, SW02 “7”, SW03 “1”. [Clear] Returns SW01, SW02 and SW03 to “1”.
(3)	Individual operation	The specified indoor unit is operated. **NOTE:** Operation contents match the setup on the remote controller. Other indoor units stay as they are.	[Setup] To operate SW01 “16”, SW02 and SW03 Set to the indoor address No. (1 to 40), and push SW04 for 2 seconds or more. [Clear] Returns SW01, SW02 and SW03 to “1”.
	Individual stop	The specified indoor unit is stopped. **NOTE:** Other indoor units are as they are.	[Setup] Setting SW01 “16”, SW02 and SW03 to the address No. (1 to 40) of the indoor unit to be operated, push SW05 for 2 seconds or more. [Clear] Returns SW01, SW02 and SW03 to “1”.

NOTE:

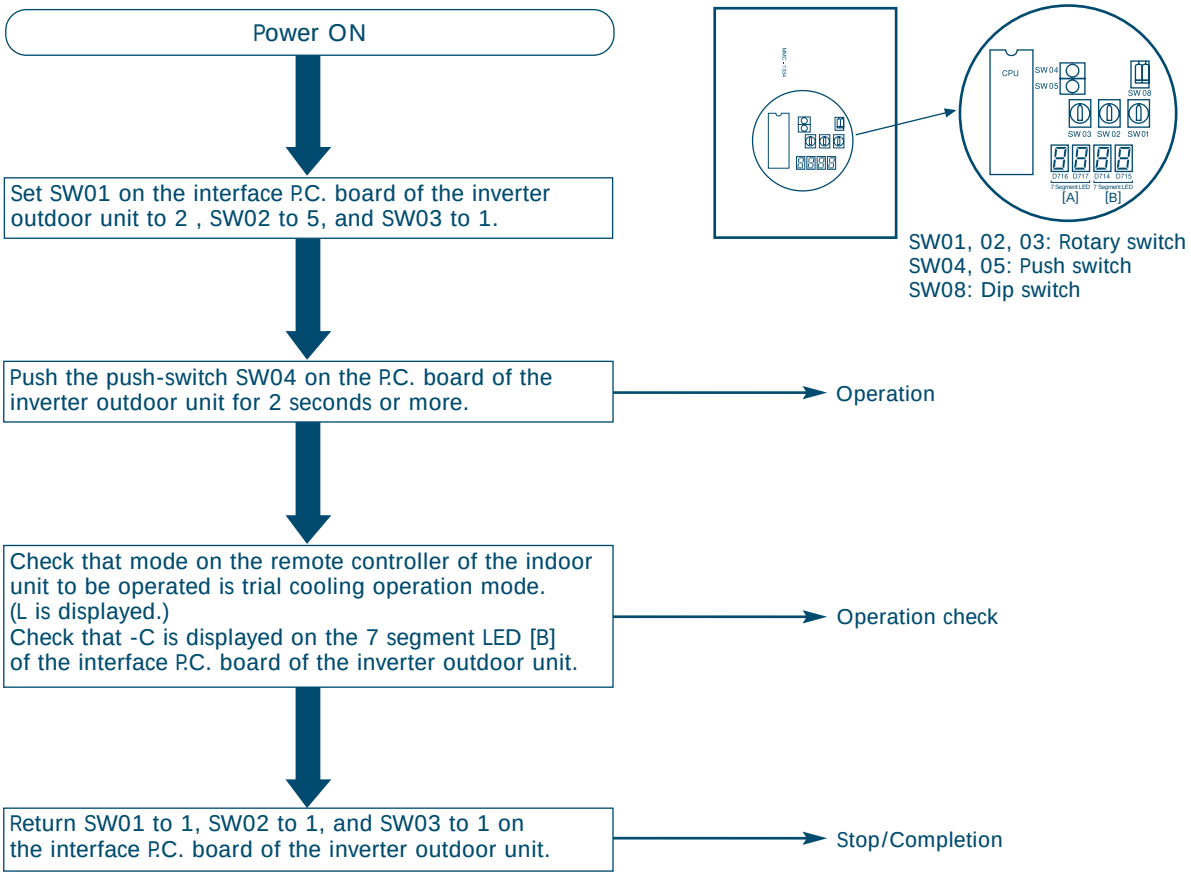
This start/stop function is only to send the mode signals such as stop/operation mode, etc. from outdoor unit to indoor unit.

Service Support Function

(1) Trial cooling operation function

This function is to change the modes of all the indoor units connected to an identical system collectively to trial cooling operation modes using the switch on interface P.C. board of the inverter type outdoor unit.

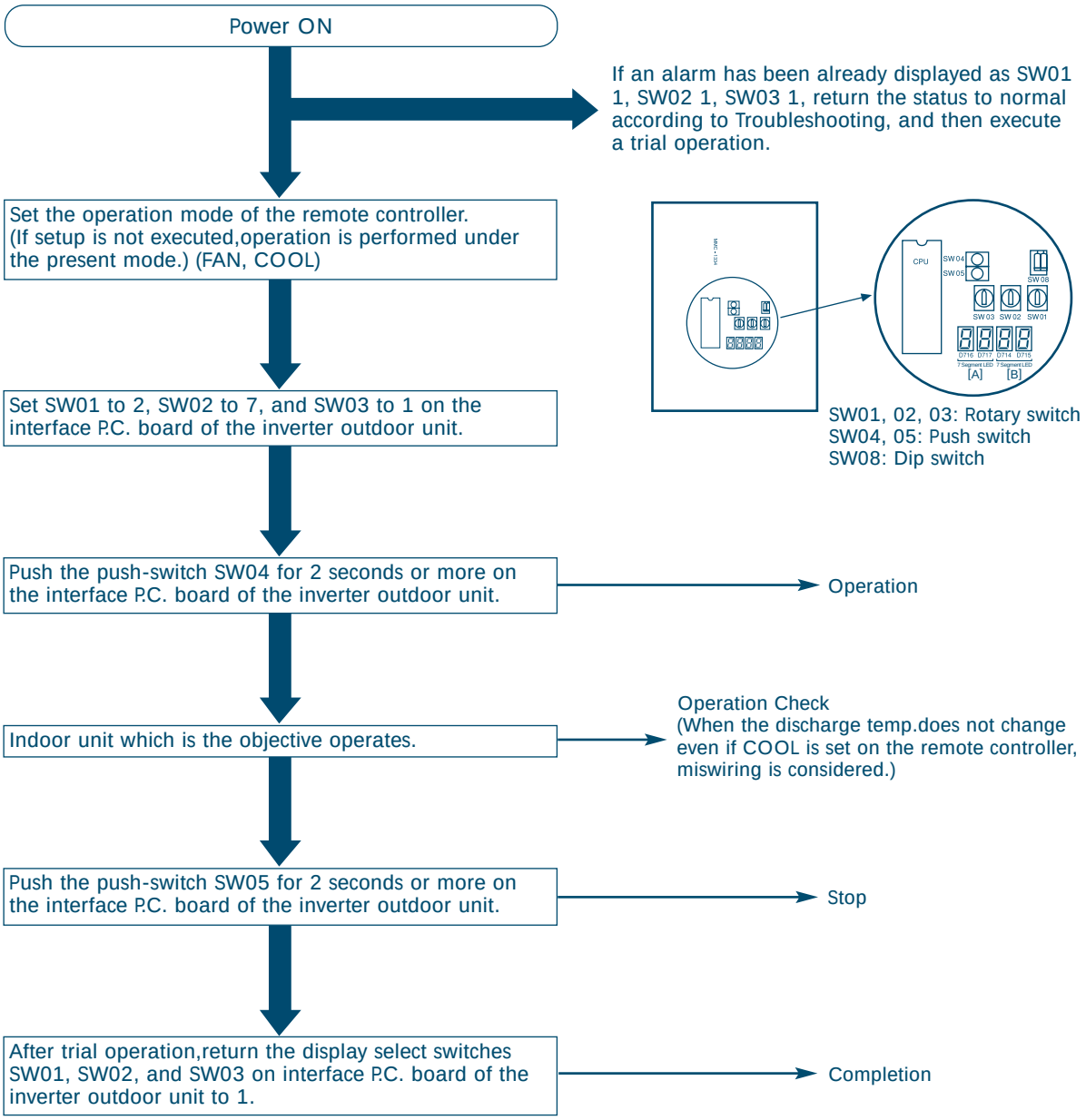
Operation procedure


Power ON
Set SW01 on the interface P.C. board of the inverter outdoor unit to 2 , SW02 to 5, and SW03 to 1.
Push the push-switch SW04 on the P.C. board of the inverter outdoor unit for 2 seconds or more.
Operation
Check that mode on the remote controller of the indoor unit to be operated is trial cooling operation mode. (L is displayed.) Check that -C is displayed on the 7 segment LED [B] of the interface P.C. board of the inverter outdoor unit.
Operation check
Return SW01 to 1, SW02 to 1, and SW03 to 1 on the interface P.C. board of the inverter outdoor unit.
Stop/Completion
CPU
SW04
SW05
SW06
SW03
SW02
SW01
[A]
[B]
SW01, 02, 03: Rotary switch
SW04, 05: Push switch
SW08: Dip switch

(2) Collective start/stop (ON/OFF) function

This function is to start/stop (ON/OFF) the indoor units connected to an identical system collectively using the switch on the interface P.C. board of the inverter outdoor unit.

Operation procedure


Power ON
If an alarm has been already displayed as SW01 1, SW02 1, SW03 1, return the status to normal according to Troubleshooting, and then execute a trial operation.
Set the operation mode of the remote controller. (If setup is not executed,operation is performed under the present mode.) (FAN, COOL)
CPU
SW04
SW05
SW08
SW03
SW02
SW01
D716
D717
D714
D715
[A]
[B]
SW01, 02, 03: Rotary switch
SW04, 05: Push switch
SW08: Dip switch
Set SW01 to 2, SW02 to 7, and SW03 to 1 on the interface P.C. board of the inverter outdoor unit.
Push the push-switch SW04 for 2 seconds or more on the interface P.C. board of the inverter outdoor unit.
Operation
Indoor unit which is the objective operates.
Operation Check
(When the discharge temp.does not change even if COOL is set on the remote controller, miswiring is considered.)
Push the push-switch SW05 for 2 seconds or more on the interface P.C. board of the inverter outdoor unit.
Stop
After trial operation,return the display select switches SW01, SW02, and SW03 on interface P.C. board of the inverter outdoor unit to 1.
Completion

(3) Individual start/stop (ON/OFF) function

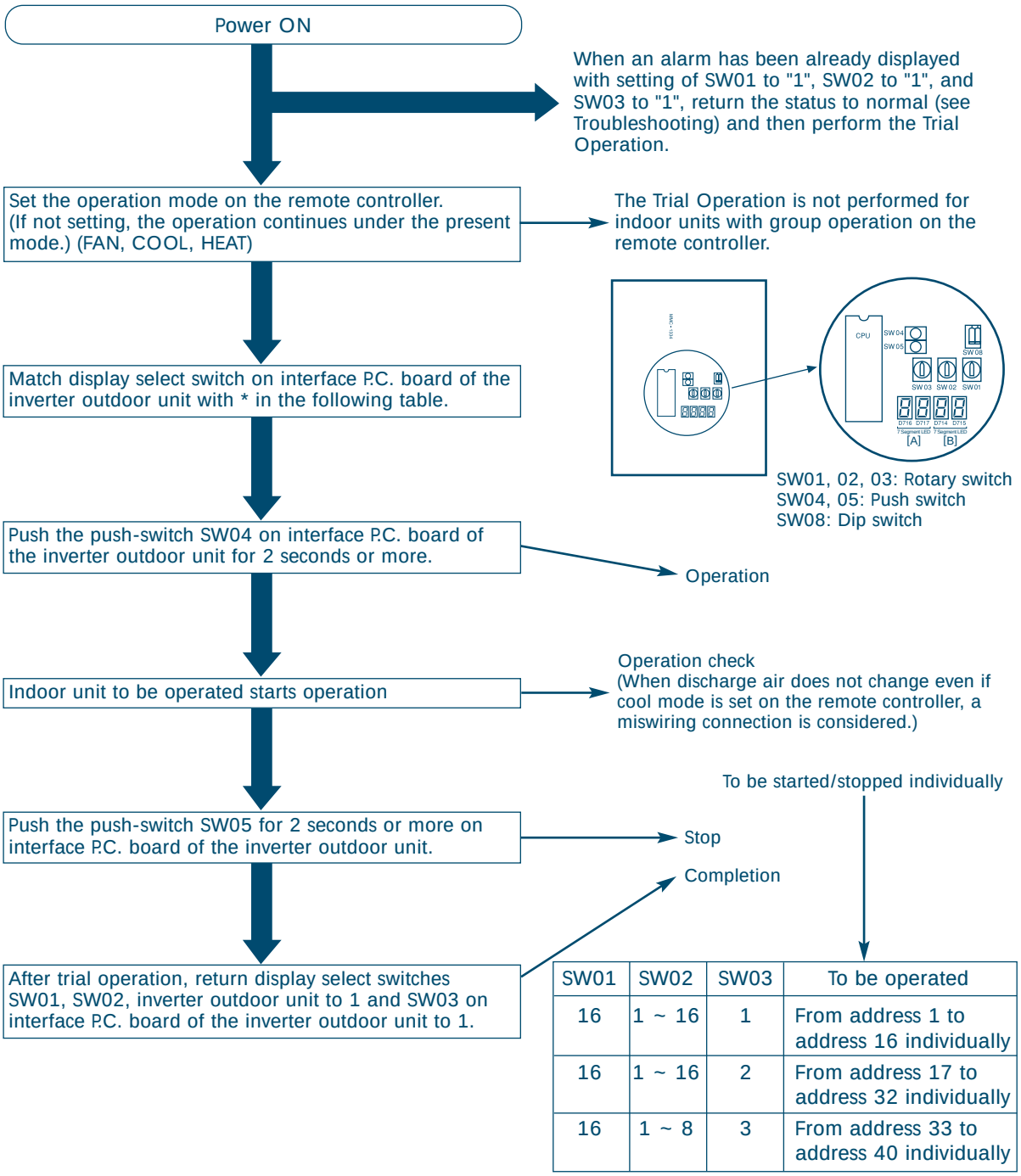
This function is to start/stop (ON/OFF) the indoor units connected to an identical system individually using the switch on interface P.C. board of the inverter outdoor unit.
Set SW01 to "16", and SW02 and SW03 to the indoor unit to be operated. (See * in the following table)

→ The set indoor units to operate alone.

(In the indoor units where group operation of remote controller is present, the indoor unit of which the rotary switch is set to 2 to 16 cannot start/stop individually.

"– –" is displayed on the 7 segment LED [B] of the control P.C. board of the inverter outdoor unit.)

Operation procedure


Power ON
When an alarm has been already displayed with setting of SW01 to "1", SW02 to "1", and SW03 to "1", return the status to normal (see Troubleshooting) and then perform the Trial Operation.
Set the operation mode on the remote controller. (If not setting, the operation continues under the present mode.) (FAN, COOL, HEAT)
The Trial Operation is not performed for indoor units with group operation on the remote controller.
Match display select switch on interface P.C. board of the inverter outdoor unit with * in the following table.
CPU
SW04
SW05
SW08
SW03
SW02
SW01
[A]
[B]
SW01, 02, 03: Rotary switch
SW04, 05: Push switch
SW08: Dip switch
Push the push-switch SW04 on interface P.C. board of the inverter outdoor unit for 2 seconds or more.
Operation
Indoor unit to be operated starts operation
Operation check
(When discharge air does not change even if cool mode is set on the remote controller, a miswiring connection is considered.)
To be started/stopped individually
Push the push-switch SW05 for 2 seconds or more on interface P.C. board of the inverter outdoor unit.
Stop
Completion
After trial operation, return display select switches SW01, SW02, inverter outdoor unit to 1 and SW03 on interface P.C. board of the inverter outdoor unit to 1.

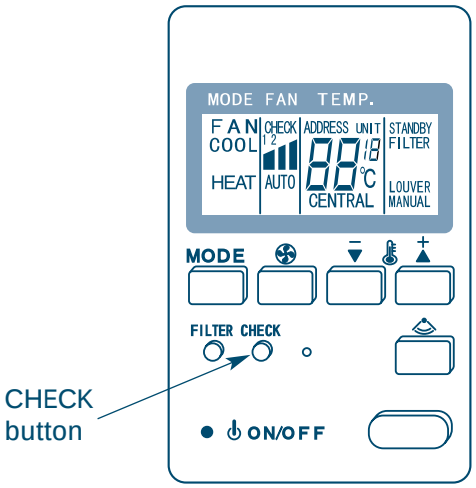
SW01	SW02	SW03	To be operated
16	1 ~ 16	1	From address 1 to address 16 individually
16	1 ~ 16	2	From address 17 to address 32 individually
16	1 ~ 8	3	From address 33 to address 40 individually

Service Support Function

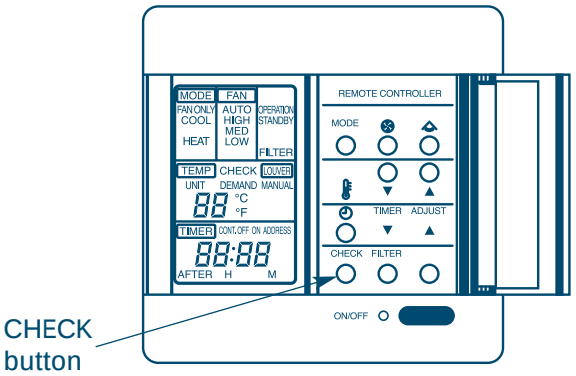
Alarm clear function

1) Clearing of check code on remote controller

This function releases ALL STOP lock status of the outdoor units (whole system) connected with the indoor unit, and restarts the operation. (→ Restarts alarm detection.)



Remote controller
RBC-SR2-PE



Main remote controller
RBC-SR1-PE

Push “CHECK” button of the remote controller for 3 seconds or more. (If pushing the button for 10 seconds and more, the check code is also cleared. (For that remote controller only))

2) Clearing the interface P.C. board of the inverter outdoor unit

It is possible to clear a detected alarm on the P.C. board of the inverter outdoor unit without resetting the power source, and enables the start of operation.
However, the check code stored on the remote controller is not removed and should be removed accordingly using the remote controller.
(Clearing setting in remote controller by the above item 1) or reset hole)

Set the switches on interface P.C. board of the inverter outdoor unit, SW01to 2, SW02 to 16", and SW03 to 1.

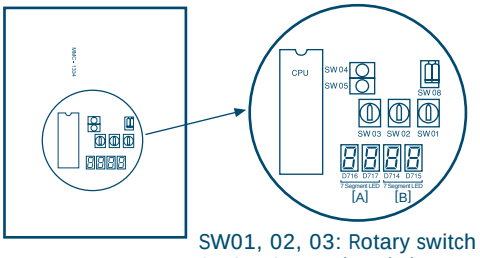
↓

Push the push-switch SW04 on interface P.C. board of the inverter outdoor unit for 5 seconds or more.

↓

Display on 7 segment LED [B] of interface P.C. board of the inverter outdoor unit changes to CL (for 5 seconds)

→ Also alarms in the indoor and lock alarm are released. (However, the check code remains in the remote controller.)
After this, alarms are detected as usual.



SW01, 02, 03: Rotary switch
SW04, 05: Push switch
SW08: Dip switch

3) Clearing of check code alarm by resetting power source

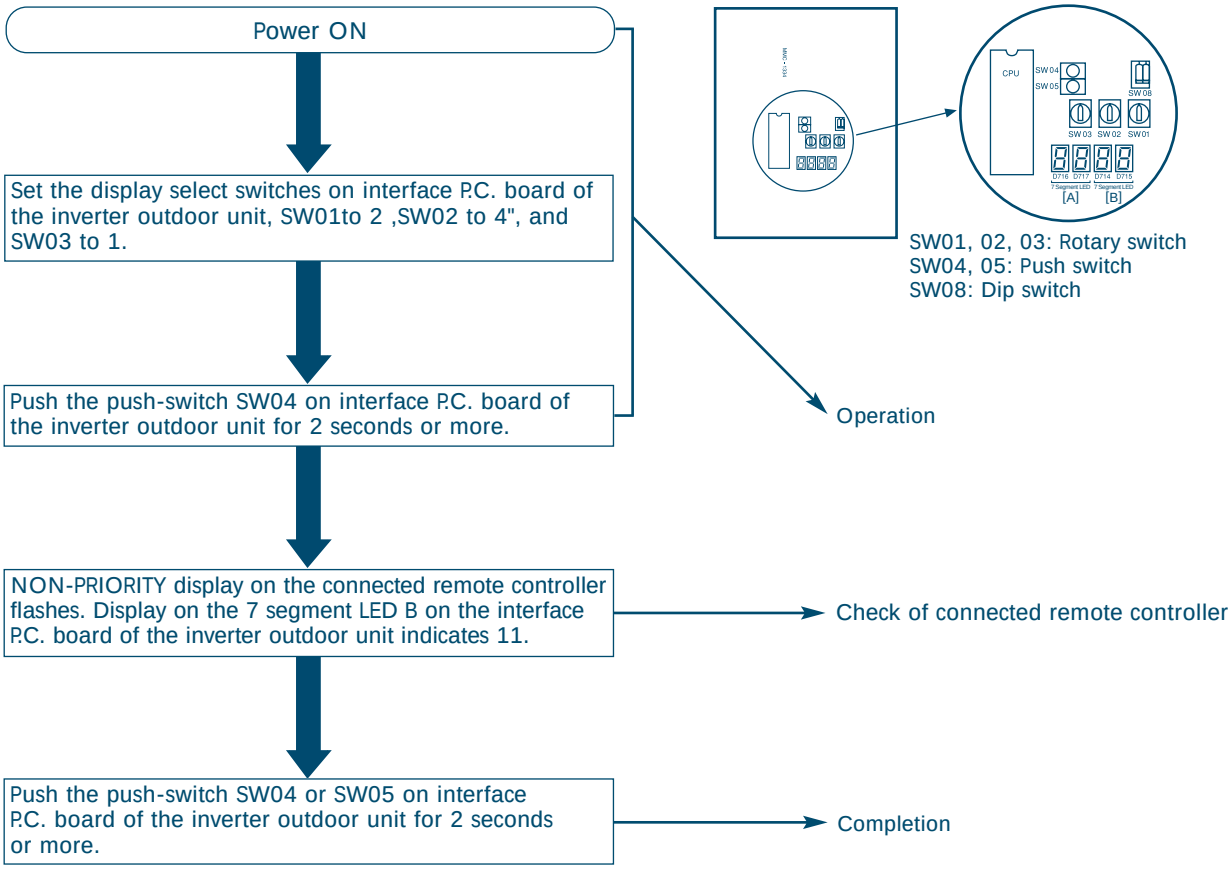
Be sure to reset both power sources of outdoor/indoor units.
Both power OFF → Turn on power of the outdoor unit first, then indoor units.

NOTE:
Even if the lock alarm related to the indoor unit is cleared by resetting power source of the outdoor unit, ALL STOP lock status of whole system is not released.

Remote controller identification function

Where many outdoor units are installed it is possible to determine the remote controller connected to a particular outdoor unit by using the P.C. board of the inverter type outdoor unit.

(Identifying procedure)


Power ON
Set the display select switches on interface P.C. board of the inverter outdoor unit, SW01to 2 ,SW02 to 4", and SW03 to 1.
Push the push-switch SW04 on interface P.C. board of the inverter outdoor unit for 2 seconds or more.
NON-PRIORITY display on the connected remote controller flashes. Display on the 7 segment LED B on the interface P.C. board of the inverter outdoor unit indicates 11.
Push the push-switch SW04 or SW05 on interface P.C. board of the inverter outdoor unit for 2 seconds or more.
Operation
Check of connected remote controller
Completion
CPU
SW04
SW05
SW06
SW03
SW02
SW01
[A]
[B]
SW01, 02, 03: Rotary switch
SW04, 05: Push switch
SW08: Dip switch

Service Support Function

Pulse Motor Valve (PMV) manual "FULL OPEN" function in the indoor unit

With switch operation on interface P.C. board of the inverter outdoor unit, this function allows manual opening of the Pulse Motor Valve (PMV) in all the indoor units for 2 minutes.

Usually, turning on power of the indoor unit once fully closes the PMV of the indoor unit.

This function is used when you want to open the PMV fully for operation after power source has been turned off for a second time.

Procedure

Set SW01 to “2”, SW02 to”3", and SW03 to “1” on the interface P.C. board of the inverter outdoor unit, and push SW04 for 2 seconds or more.

(7 segment display [B] changes to “FF” for 2 minutes.)

Clear

After set up, PMV returns to normal open pulse automatically when 2 minutes has passed. (Opened fully for 2 minutes only against FULL OPEN signal from the outdoor unit or software of the indoor unit.)

Pulse Motor Valve (PMV) forced FULL OPEN / FULL CLOSE function in outdoor unit

This function allows forced opening/closing of the electronic control valve (PMV), used in the outdoor unit, for 2 minutes.

Full Open

Short circuit CN30 on interface P.C. board of the inverter outdoor unit.

Full Close

Short circuit CN31 on interface P.C. board of the inverter outdoor unit.

Clear

Both FULL OPEN/ FULL CLOSE return to normal open pulse when 2 minutes has passed.
Be sure to remove the short-circuit after check.

NOTE:

Switch off bit 1 side of DIP SW08.

Refrigerant Recovery Method for a Failed Outdoor Unit

When multiple outdoor units are connected in a system, the refrigerant can be recovered from the outdoor unit to be repaired by performing the reclaim operation to a functional outdoor unit.

*** NOTE 1:** The refrigerant recovery ratio changes according to the outside temp., etc. After reclaim operation, recover the remaining gas using a recovery device, etc., and be sure to measure the recovered refrigerant amount. During reclaim, it is necessary to heat the accumulator and compressor bottom to increase the recovery ratio.

*** NOTE 2:** Once complete, the system cannot be operated until the failed outdoor unit has been completely repaired.
(Continuous operation is unavailable because of refrigerant over-charge.)

*** NOTE 3:** If PMV A and B are fully closed due to failure, this reclaim function is not available. In this case, recover all refrigerant in the system.

Work procedure (A)

When back-up operation has not been utilised.

A-1) Turn on the power source of all the outdoor units, and keep the system in stop status (Indoor unit stop).
If insulation resistance of the failed outdoor unit compressor is insufficient, remove the compressor cable before turning on the power source.

A-2) For the failed outdoor unit, complete the following operations.

1) Close the liquid service valve fully. (Keep the gas pipe and balancing pipe valve opened fully.)

2) Set the rotary switches on the interface P.C. board to the following numbers:
   - SW03 [No.1]/SW02 [No.11]/SW01 [No.2]
   - 7 segment display: [r .][d][ ][ ]

3) Push switch SW04 on the interface P.C. board for 5 seconds or more.
   Steps 'a' to 'e' should occur.
   * To cease work at any time, turn off the power source of all the outdoor units or push switch SW05 on the interface P.C. board.
   a. 7 segment display: [r .][d][1][1]
   b. The outdoor unit fan operates.
   c. PMVA and PMVB open.
   d. Solenoid valves SV3A, SV3B, and SV3C are turned on.
   e. Other outdoor units start automatic operation in trial cooling mode. (Compressor activation is time controlled.)

4) Press the push-switch SW04 on the interface P.C. board for approx. 2 seconds.
   The present refrigerant pressure data (MPaG) is displayed.
   - 7 segment display: [H][* .][*][*] (*: Value of Pd pressure sensor)
   - With every press of the push-switch SW04 the display changes.

Initial display [r .][d][1][1] → Pd pressure: [Pd] [H][* .][*][*] → Ps pressure: [Ps] [L][* .][*][*]

Replacing the Compressor

Refrigerant Recovery Method

A-3) 10 minutes after the system has been activated, close the gas pipe and balance pipe service valves of the **failed outdoor unit** fully.

A-4) Turn off the power source for all the outdoor units.

A-5) Recover the remaining gas in the failed outdoor unit using a refrigerant recovery device. (Calculate the recovered refrigerant, and be sure to add the calculated amount of refrigerant after repair has completed.)

A-6) The refrigerant recovery work is finished.

Work procedure (B)

When back-up operation has been utilised.

B-1) Turn on the power source of all the outdoor units, and keep the system in stop status (Indoor unit stop).
If insulation resistance of the failed outdoor unit compressor is insufficient, remove the compressor cable before turning on the power source.

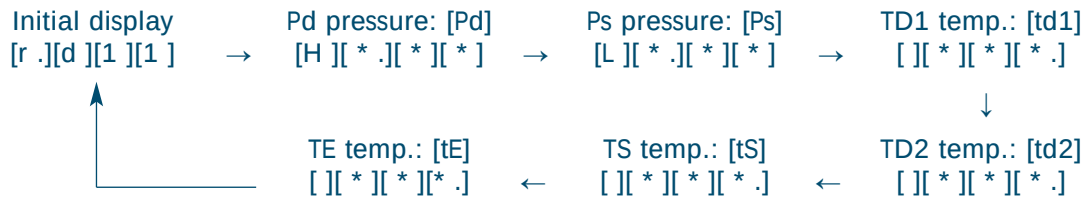
B-2) For the failed outdoor unit, execute the operations in **Work procedure A-2**, from steps 1) to 4).
* During setup of back-up, the system can automatically activate. Execute operation in item **B-3**).

B-3) For the outdoor unit selected as the master unit (usually the Inverter unit), execute the following operations.

1) Set the rotary switches on the interface P.C. board to the following numbers:
   - SW03 [No.1]/SW02 [No.5]/SW01 [No.2] (Trial cooling mode)
   - 7 segment display: [C .][ ][ ][ ]

2) Hold the push-switch SW04 on the interface P.C. board for 5 seconds or more.
   The system starts operation in trial cooling mode.
   - 7 segment display: [C][ ][–][C]
   * To interrupt the work, turn off the power source of all the outdoor units or push the push-switch SW05 on the interface P.C. board.

3) Push the switch SW04 on the interface P.C. board to set the mode to Ps pressure data display mode.
   * Every push of the switch SW04 for approx. 2 seconds, display content changes as follows:



B-4) 10 minutes after the system has started the operation in trial cooling mode, close the gas pipe and balance pipe service valves of the **failed outdoor unit** fully.

B-5) Complete steps **A4** to **A6** as explained previously.

Explanatory Diagram: Modular Multi Service Valve

Figure: Open/Close direction of service valve

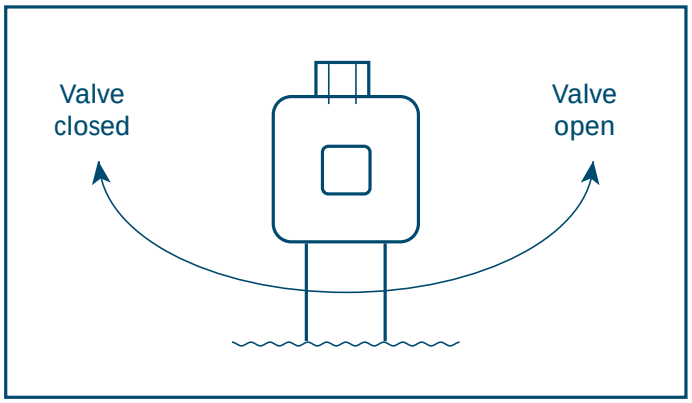
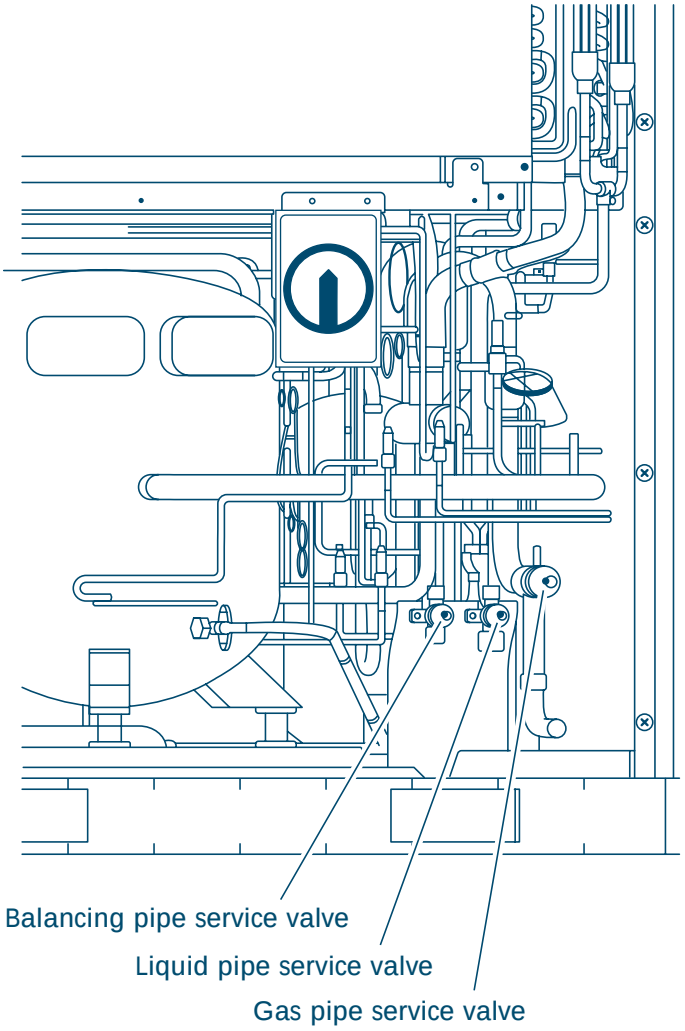
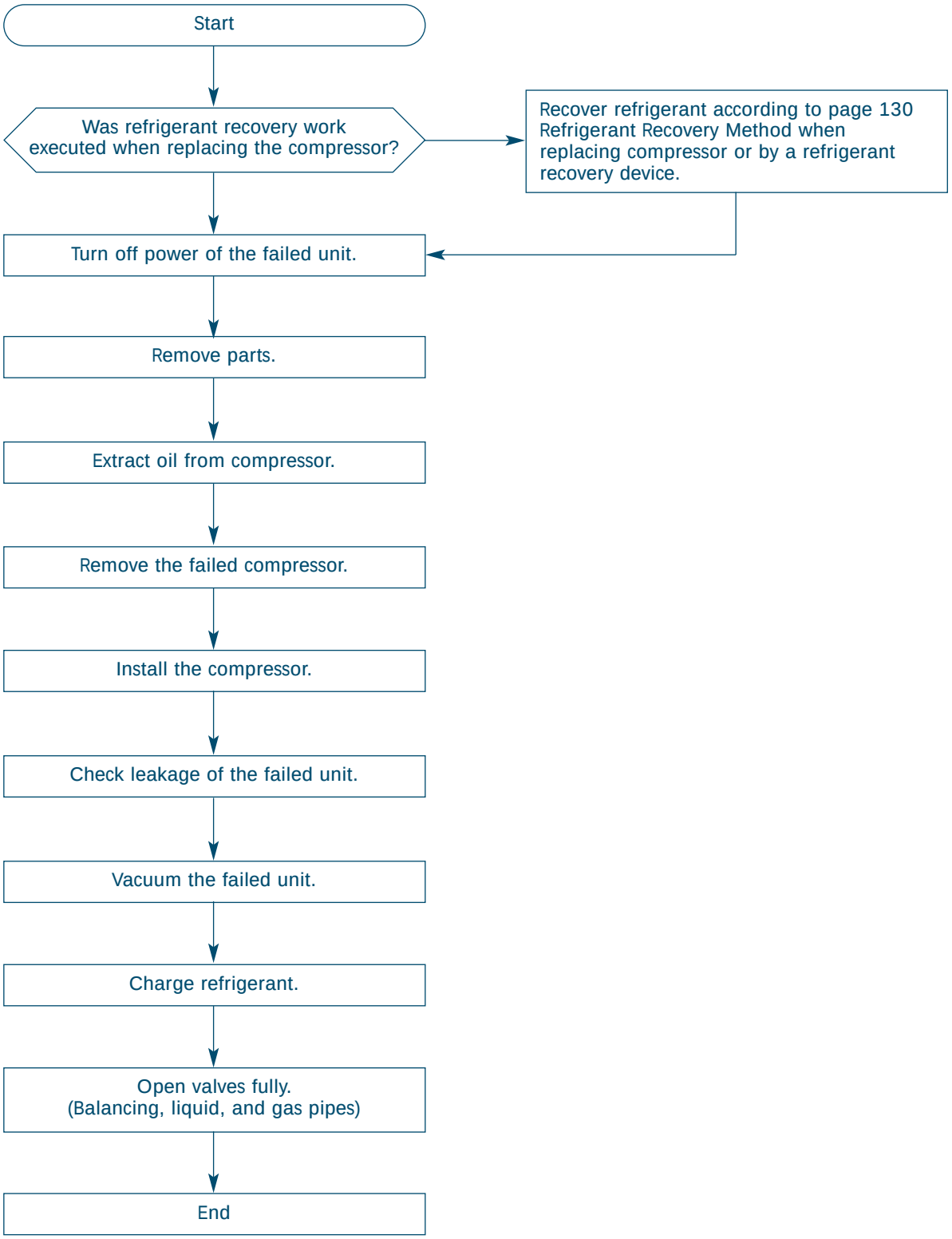


Figure: Position of service valve



Replacing the Compressor

Compressor Replacement Procedure


Start
Was refrigerant recovery work executed when replacing the compressor?
Recover refrigerant according to page 130 Refrigerant Recovery Method when replacing compressor or by a refrigerant recovery device.
Turn off power of the failed unit.
Remove parts.
Extract oil from compressor.
Remove the failed compressor.
Install the compressor.
Check leakage of the failed unit.
Vacuum the failed unit.
Charge refrigerant.
Open valves fully.
(Balancing, liquid, and gas pipes)
End

Replacing the Compressor

Compressor Replacement Procedure

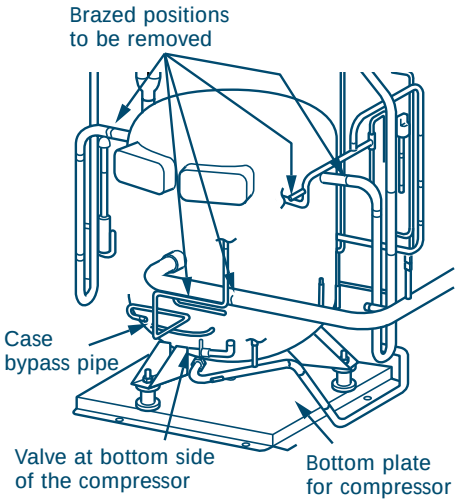
After recovery of refrigerant is complete, turn off the power source, and replace the compressor according to the following method.

[In case of removal of the compressor from the front side]

1. Outdoor units (Inverter and fixed-speed units)
MM-A0280HT, MM-A0224HT, MM-A0280HX, MM-A0224HX

Removing of parts

- Remove the front painted panel.
- Remove electrical parts cover.
- Disconnect all wires connected to the electric parts box.
  Temp. sensor, pressure sensor, complete, 2-way valve, PMV, 4-way valve, etc.
- Remove the electric parts box.
- Remove the isolator fixing plate. (Do not remove the pressure sensor.)
- Remove the cooling duct for the electric parts.
- Remove the crank case heater.
  (Only for fixed-speed unit)
- Remove the sound-proof blanket.
- Remove the terminal cover of the compressor, and remove all wires.
- Close the valve located under the compressor fully using a hexagonal wrench.



Extraction of oil from compressor

- Cut the case bypass located at the bottom of the compressor by the same height as that of the suction pipe.
- Connect hose to the cut case bypass, and insert the opposite side of the hose in the container in which oil is discharged. 7.5ℓ or more oil may flow through the hose, so use a container with capacity of 8ℓ or more.
- Apply nitrogen gas with approx. 0.02MPa from service valve at gas side to extract oil. (Extract oil completely.)

Removing of compressor

- Remove two discharge pipes, suction pipe, upper oil return piping, oil tank piping, and case bypass piping.

NOTE:

Take great care when removing the pipes with a brazing torch – if oil is remaining in the pipe, a flame may be emitted at the moment when the flux melts.

- Loosen the flare nut at the bottom side of the compressor to remove the pipe.
- Remove the screws fixing the bottom plate for the compressor.
- Pull out the compressor with the bottom plate for the compressor.

NOTE:

Weight of the compressor is approx. 100kg.

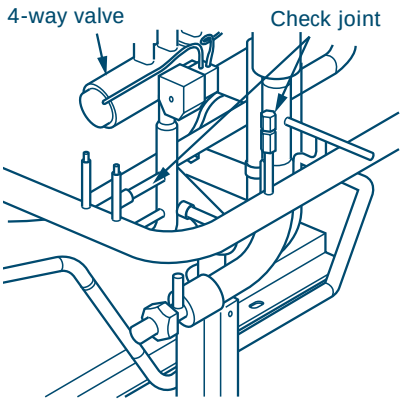
- Remove the nuts fixing the compressor.
- Remove the compressor.

Replacing the Compressor

Compressor Replacement Procedure

Installation
- Install the compressor in the reverse order of removing the compressor.

NOTE:
After installation, fully open the valve at bottom side of the compressor, using a hexagonal wrench.

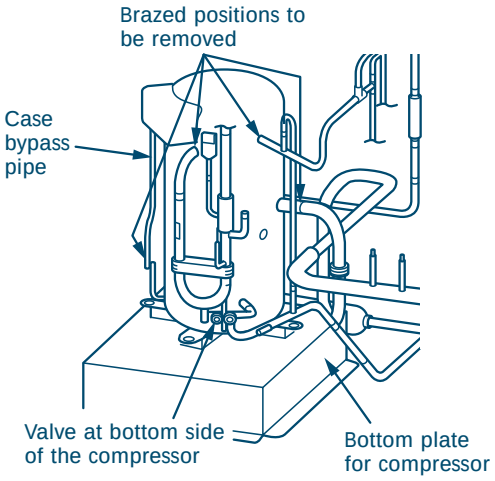


Vacuuming
- Connect the vacuum pump to the check joint of the discharge and suction pipes, and operate the vacuum pump.
- Perform vacuuming until the vacuum low-pressure gauge indicates 0.750 (mmHg).

Charging of refrigerant
- Add refrigerant of the same volume as the recovered refrigerant into the check joint of the suction pipe.

2. Outdoor unit
MM-A0160HX

Removal of parts
- Remove the front painted panel.
- Remove electrical parts cover.
- Disconnect all wires connected to the electric parts box, temp. sensor, pressure sensor, complete, 2-way valve, PMV, 4-way valve, etc.
- Remove the electric parts box.
- Remove the cooling duct for electric parts box.
- Remove the crank case heater.
- Remove the sound-proof mat.
- Remove the terminal cover of the compressor, and remove all wires.
- Fully close the valve located under the compressor using a hexagonal wrench.



Extraction of oil from compressor
- Cut the case bypass located at the bottom of the compressor by the same height as that of the suction pipe.
- Connect hose to the cut case bypass, and insert the opposite side of the hose in the container in which oil is discharged. 2ℓ or more oil may flow through the hose, so use a container with capacity of 2.5ℓ or more.
- Apply nitrogen gas with approx. 0.02MPa from service valve at gas side to extract oil. (Extract oil completely.)

Removing of compressor
- Remove the discharge pipe, suction pipe, upper oil return piping, oil tank piping, and case bypass piping.

NOTE:
Take great care when removing the pipes with a brazing torch if oil is remaining in the pipe, a flame may be emitted at the moment when flux has been melted.
- Loosen the flare nut at the bottom side of the compressor to remove the pipe.
- Remove the screws fixing the bottom plate for the compressor.
- Pull out the compressor with the bottom plate for the compressor.

Replacing the Compressor

Compressor Replacement Procedure

NOTE:
Weight of the compressor is approx. 45kg.
- Remove the nuts fixing the compressor.
- Remove the compressor.

Installation
- Install the compressor in the reverse order of removing the compressor.

NOTE:
After installation, fully open the valve at bottom side of the compressor, using a hexagonal wrench.

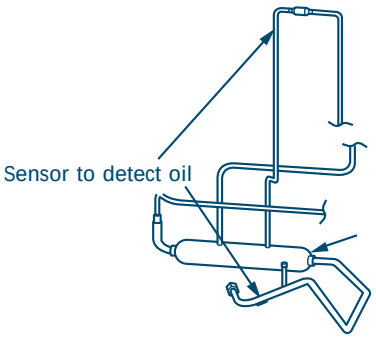
Vacuuming
- Connect the vacuum pump to the check joint of the discharge and suction pipes, and operate the vacuum pump.
- Perform vacuuming until the vacuum low-pressure gauge indicates 0.750 (mmHg).

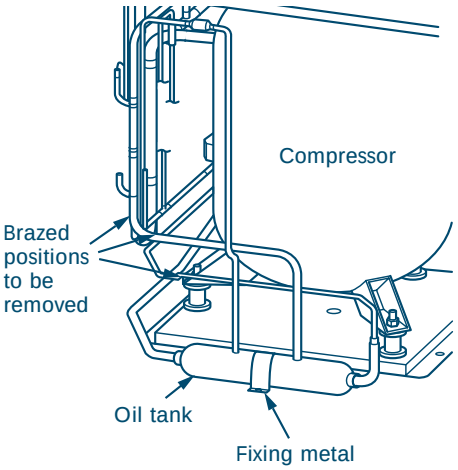
Charging of refrigerant
Add refrigerant of the same volume as the recovered refrigerant into the check joint of the suction pipe.

[In case of removal of the compressor from the rear side]

1. Outdoor unit (Inverter and fixed-speed units)
MM-A0280HT, MM-A0280HX, MM-A0224HT, MM-A0224HX

Removing of parts
- Remove the front painted panel.
- Remove electrical parts cover.
- Disconnect all wires connected to the electric parts box, temp. sensor, pressure sensor, complete, 2-way valve, PMV, 4-way valve, etc.
- Remove the rear painted panel.
- Remove the crank case heater. (Only for fixed-speed unit)
- Remove the sound-proof mat.
- Remove the terminal cover of the compressor, and remove all wires.
- Remove two temp. sensors for oil detection.
- Fully close the valve located under the compressor using a hexagonal wrench.





Extraction of oil from compressor
- Cut the case bypass located at the bottom of the compressor by the same height as that of the suction pipe.
- Connect hose to the cut case bypass, and insert the opposite side of the hose in the container in which oil is discharged. 7.5ℓ or more oil may flow through the hose, so use a container with capacity of 8ℓ or more.
- Apply nitrogen gas with approx. 0.02MPa from service valve at gas side to extract oil. (Extract oil completely.)

Replacing the Compressor

Compressor Replacement Procedure

Removing of compressor

- Remove two discharge pipes, suction pipe, upper oil return piping, oil tank piping, and case bypass piping.
  (Same case for pulling out from the front side)

NOTE:

Take great care when removing the pipes with a brazing torch – if oil is remaining in the pipe, a flame may be emitted at the moment when the flux melts.

- Loosen the flare nut at the bottom side of the compressor to remove the pipe.
- Remove the metal fixing the oil tank.
- Remove the oil tank. (Two brazing positions)
- Remove the screws fixing the bottom plate for the compressor.
- Pull out the compressor with the bottom plate for the compressor.

NOTE:

Weight of the compressor is approx. 100kg.

- Remove the nuts fixing the compressor.
- Remove the compressor.

Installation

- Install the compressor in the reverse order of removing the compressor.

NOTE:

After installation, fully open the valve at bottom side of the compressor, using a hexagonal wrench.

Vacuuming

- Connect the vacuum pump to the check joint of the discharge and suction pipes, and operate the vacuum pump.
- Perform vacuuming until the vacuum low-pressure gauge indicates 0.750 (mmHg).

Charging of refrigerant

- Add refrigerant of the same volume as the recovered refrigerant into the check joint of the liquid pipe.

Compressor Replacement Procedure

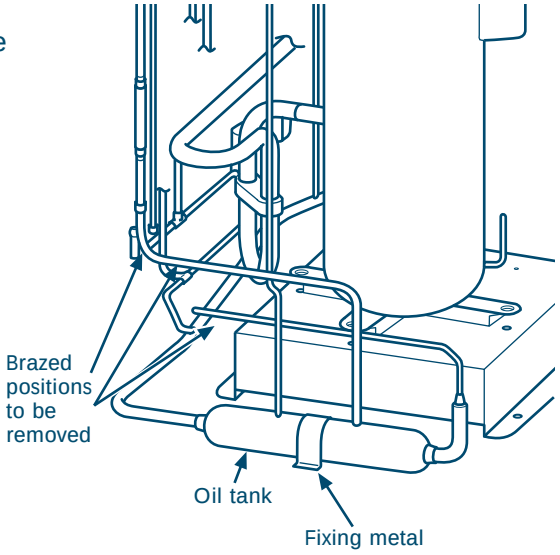
2. Outdoor unit
MM-A0160HX

Removing of parts

- Remove the front painted panel.
- Remove electrical parts cover.
- Disconnect all wires connected to the electric parts box, temp. sensor, pressure sensor, complete, 2-way valve, PMV, 4-way valve, etc..
- Remove the electric parts box.
- Remove the rear painted panel.
- Remove the crank case heater.
- Remove the sound-proof blanket.
- Remove the terminal cover of the compressor, and remove all wires.
- Remove two temp. sensors for oil detection from the pipe.
- Fully close the valve located under the compressor fully using a hexagonal wrench.

Extraction of oil from compressor

- Cut the case bypass located at the bottom of the compressor by the same height as that of the suction pipe.
- Connect hose to the cut case bypass, and insert the opposite side of the hose in the container in which oil is discharged. 2ℓ or more oil may flow through the hose, so use a container with capacity of 2.5ℓ or more.
- Apply nitrogen gas with approx. 0.02MPa from service valve at gas side to extract oil. (Extract oil completely.)



Removing of compressor

- Remove the discharge pipe, suction pipe, upper oil return piping, oil tank piping, and case bypass piping. (Same case for removing from the front side)

NOTE:

Take great care when removing the pipes with a brazing torch – if oil is remaining in the pipe, a flame may be emitted at the moment when the flux melts.

- Loosen the flare nut at the bottom side of the compressor to remove the pipe.
- Remove the metal fixing the oil tank.
- Remove the oil tank. (Two brazing positions)
- Remove the screws fixing the bottom plate for the compressor.
- Pull out the compressor with the bottom plate for the compressor.

NOTE:

Weight of the compressor is approx. 45kg.

- Remove the nuts fixing the compressor.
- Remove the compressor.

Replacing the Compressor

Compressor Replacement Procedure

Installation

- Install the compressor in the reverse order of removing of compressor.

NOTE:

After installation, fully open the valve at bottom side of the compressor, using a hexagonal wrench.

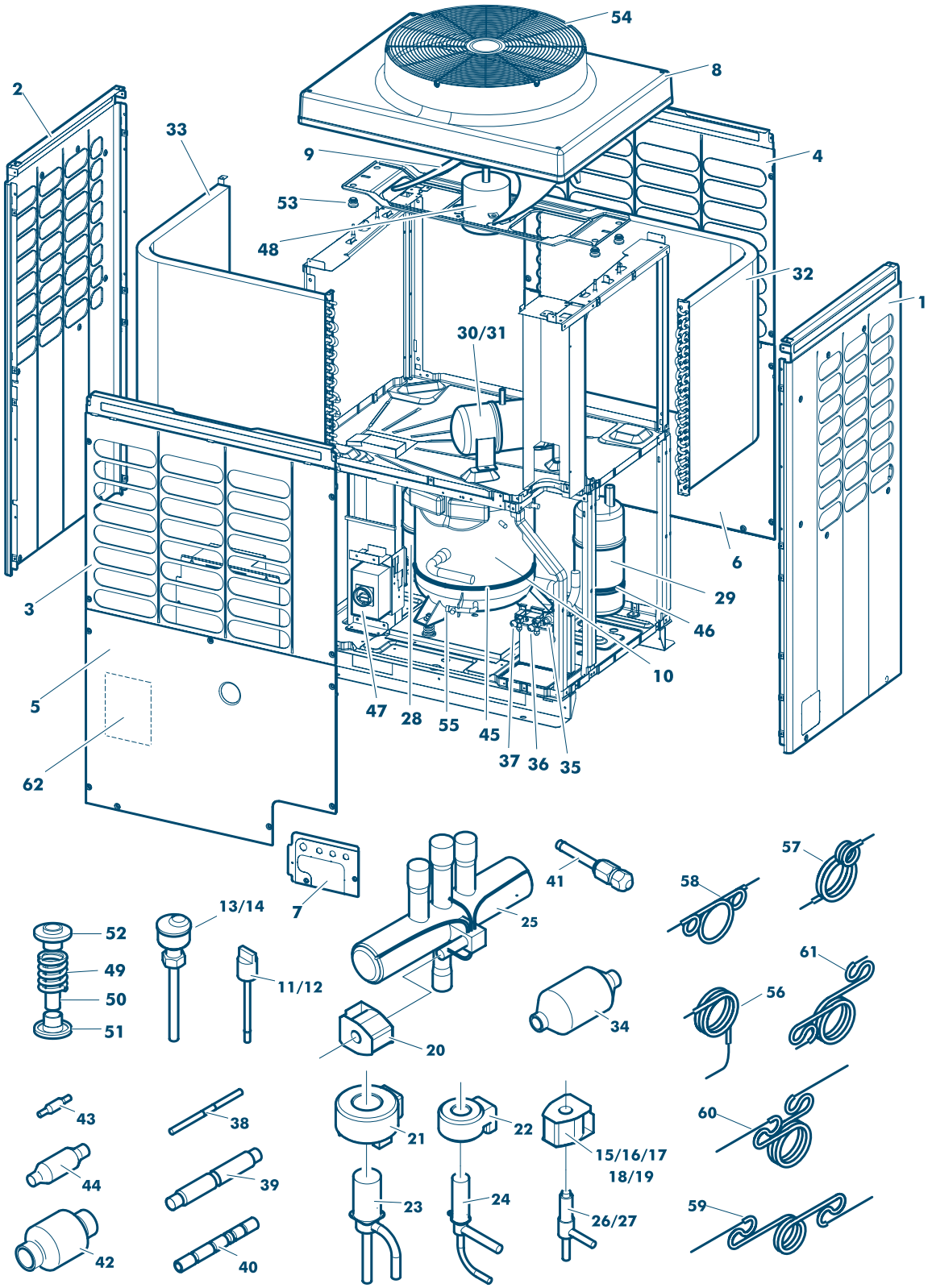
Vacuuming

- Connect the vacuum pump to the check joint of the discharge and suction pipes, and operate the vacuum pump.
- Perform vacuuming until the vacuum low-pressure gauge indicates 0.750 (mmHg).

Charging of refrigerant

Add refrigerant of the same volume to the recovered refrigerant into the check joint of the liquid pipe.

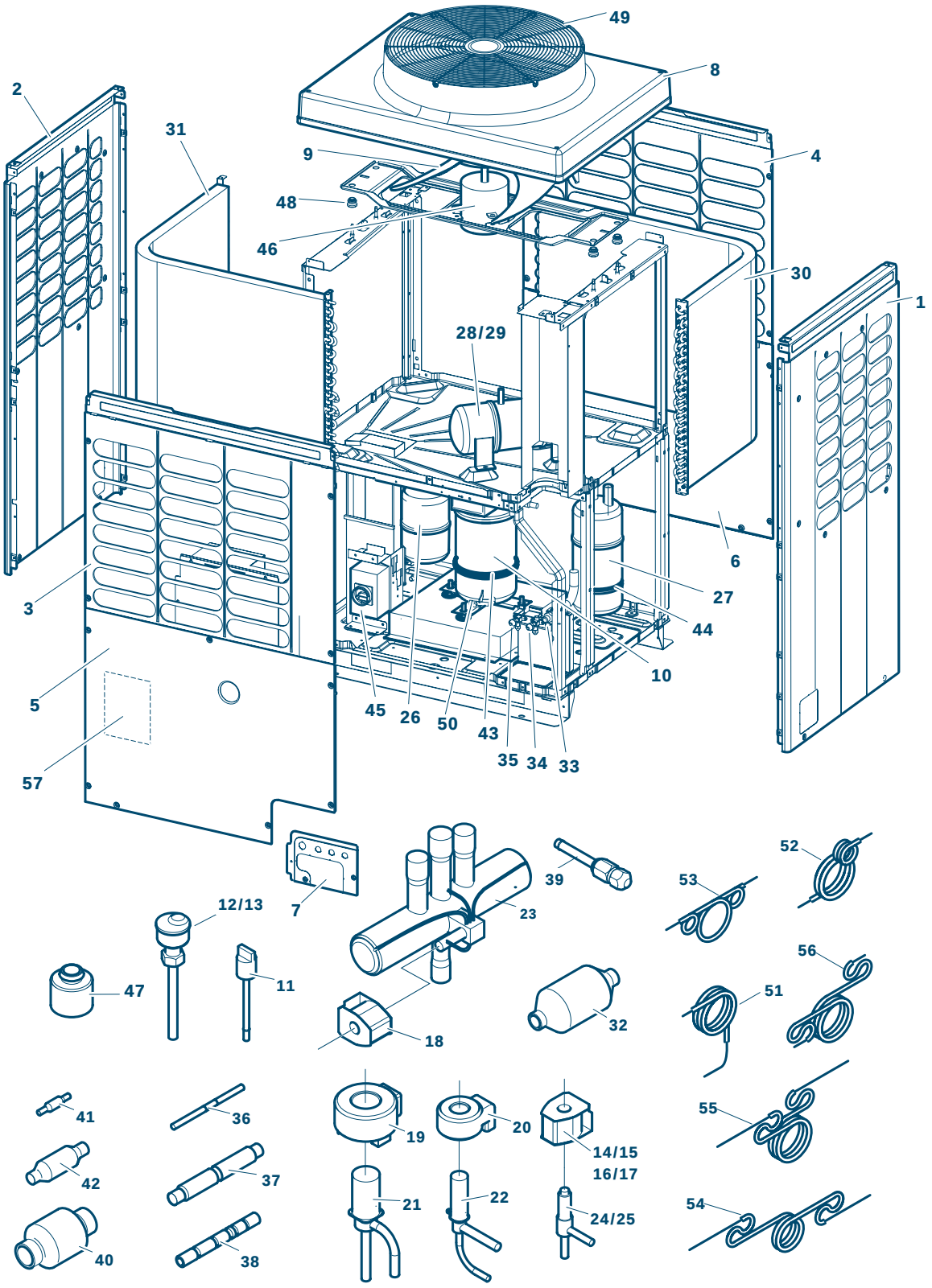
MM-A0280HT, MM-A0280HX, MM-A0224HT, MM-A0224HX



MM-A0280HT, MM-A0224HT, MM-A0280HX, MM-A0224HX

Ref No	Part No	Description	MODEL (MM-A)			
			0280HT	0224HT	0280HX	0224HX
1	43A00020	PLATE-SIDE (Right)	1	1	1	1
2	43A00021	PLATE-SIDE (Left)	1	1	1	1
3	43A00022	AIR-IN-CABINET (Front)	1	1	1	1
4	43A00023	AIR-IN-CABINET (Back)	1	1	1	1
5	43A00024	CABINET-DOWN (Front)	1	1	1	1
6	43A00025	CABINET-DOWN (Back)	1	1	1	1
7	43A00026	SERVICE PANEL	1	1	1	1
8	43A00027	AIR-OUT-CABINET	1	1	1	1
9	43A20004	PROPELLER FAN – PY631	1	1	1	1
10	43A41510	COMPRESSOR – 10HP/8HP (INV)	1	1		
10	43A41511	COMPRESSOR – 10HP (FIXED)			1	
10	43A41512	COMPRESSOR – 8HP (FIXED)				1
11	43A49004	HIGH PRESSURE SWITCH	1	1		
11	43A49005	HIGH PRESSURE SWITCH			1	1
12	43A49006	HIGH PRESSURE SWITCH	1	1	1	1
13	43A49007	ASM-PRESSURE-SENSOR (Low – Blue)	1	1	1	1
14	43A49008	ASM-PRESSURE-SENSOR (High – Red)	1	1	1	1
15	43A46019	ASM – SOLENOID COIL – 2-WAY (SV41 + SV42)			1	1
16	43A46020	ASM – SOLENOID COIL – 2-WAY (SV2 + SV3A)	1	1	1	1
17	43A46021	ASM – SOLENOID COIL – 2-WAY (SV42)	1	1		
18	43A46022	ASM – SOLENOID COIL – 2-WAY (SV3B)	1	1	1	1
19	43A46023	ASM – SOLENOID COIL – 2-WAY (SV3C)	1	1	1	1
20	43A46024	ASM – SOLENOID COIL – 4-WAY (J502 AC240V)	1	1	1	1
21	43A46025	COIL – ULSE MOTOR VALVE (L12A-03)	2	2	2	2
22	43A46026	COIL – PULSE MOTOR VALVE (A12A15)	1	1	1	1
23	43A46027	BODY – PULSE MOTOR VALVE (CEV30RC1)	2	2	2	2
24	43A46028	BODY – PULSE MOTOR VALVE (SEV18RC4)	1	1	1	1
25	43A46007	VALVE BODY – 4WAY (CHV-0712)	1	1	1	1
26	43046151	VALVE BODY – 2WAY (NEV-202DXF)	3	3	4	4
27	43A46034	VALVE BODY – 2WAY (NEV-603DXF)	2	2	2	2
28	43A48007	OIL SEPERATOR	1	1	1	1
29	43A48005	ACCUMULATOR	1	1	1	1
30	43A48006	LIQUID TANK	1	1	1	1
31	43A60013	FUSIBLE PLUG	1	1	1	1
32	43A43018	CONDENSER ASSEMBLY – RIGHT	1	1	1	1
33	43A43019	CONDENSER ASSEMBLY – LEFT	1	1	1	1
34	43A45003	DRYER – XH10 (R407C)	2	2	2	2
35	43146351	SERVICE VALVE (Gas)	1	1	1	1
36	43A46029	PACKED VALVE (Liquid)	1	1	1	1
37	43A46030	PACKED VALVE (Oil)	1	1	1	1
38	43A46031	CHECK VALVE (BCV - 302DY) Dia 8mm	3	3	3	3
39	43A46032	CHECK VALVE (BCV - 304DY) Dia 15mm	1	1	2	2
40	43A46035	CHECK VALVE (MP3.3MPaG) Dia 12.7mm	2	2	2	2
41	43A46036	CHECK JOINT (3.3MPa)	3	3	3	3
42	43147529	STRAINER (Dia 44mm)	1	1	1	1
43	43A47019	STRAINER (Dia 12.7mm)	3	3	3	3
44	43A47042	STRAINER (Dia 19mm)	1	1	1	1
45	43A57001	CRANK CASE HEATER (74W)			1	1
46	43A57002	ACCUMULATOR HEATER (29W)	1	1	1	1
47	43A51005	ISOLATOR (4 pole – 32 Amp)	1	1	1	1
48	43A21022	FAN MOTOR (STF – 200 – 350A)	1	1	1	1
49	43107200	SPRING	3	3	3	3
50	43195198	SPACER	3	3	3	3
51	43195186	RUBBER CUSHION – UNDER	3	3	3	3
52	43195185	RUBBER CUSHION – UPPER	3	3	3	3
53	43A95001	RUBBER SUPPORT CUSHION (Fan Motor Assembly)	4	4	4	4
54	43A19011	FAN GUARD	1	1	1	1
55	43A46033	FLARE NUT (Oil Circuit)	1	1	1	1
56	43A47043	CAPILLARY ASSEMBLY (1.0x2.0x1000 – Oil inlet)	1	1	1	1
57	43A47044	CAPILLARY ASSEMBLY (1.2x2.4x1000 – Suction)	1	1	1	1
58	43A47045	CAPILLARY ASSEMBLY (2.0x3.0x1000 – By-pass)	1	1	1	1
59	43A47046	CAPILLARY ASSEMBLY (1.2x2.4x1000 – Main oil)	2	2	2	2
60	43A47047	CAPILLARY ASSEMBLY (1.0x2.0x1000 – Discharge)	2	2	2	2
61	43A47048	CAPILLARY ASSEMBLY (1.0x2.0x1000 – By-pass)			1	1
62	43A16001	WIRING DIAGRAM	1	1		
62	43A16002	WIRING DIAGRAM			1	1

MM-A0160HX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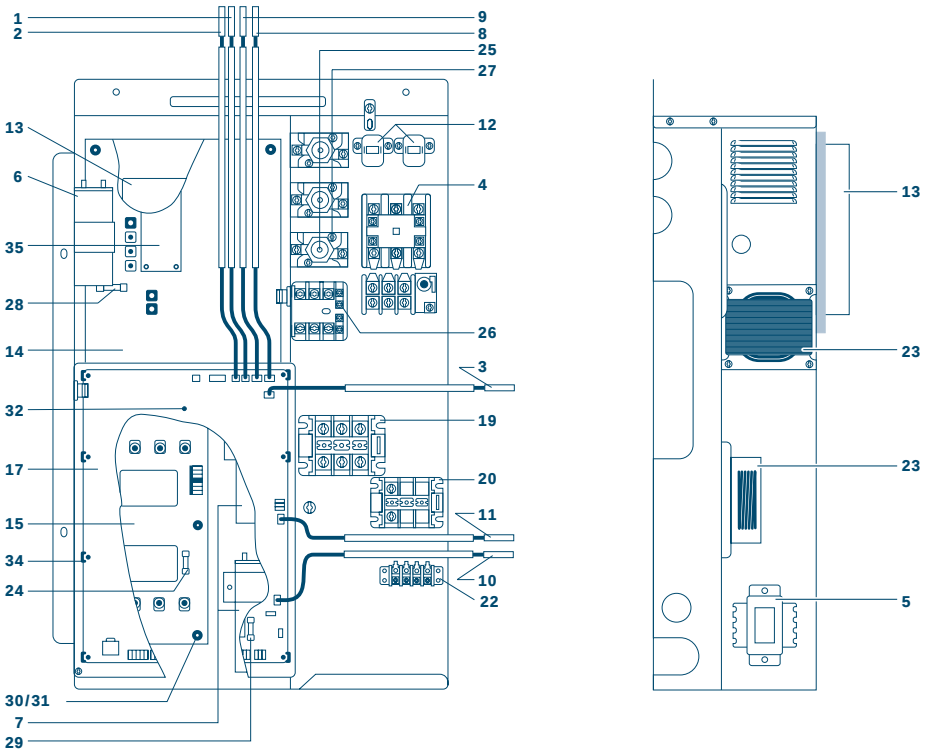
Outdoor Units

MM-A0160HX

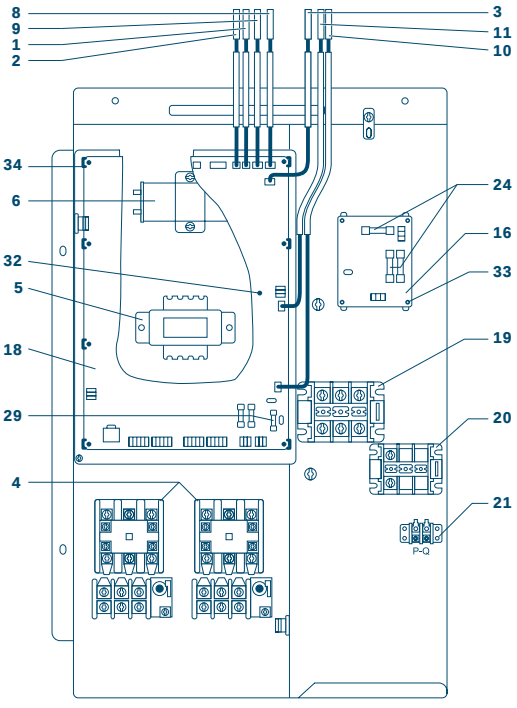
Ref No.	Part No.	Description	Model Name
			MM-A0160HX
1	43A00020	PLATE-SIDE (Right)	1
2	43A00021	PLATE-SIDE (Left)	1
3	43A00022	AIR-IN-CABINET Front)	1
4	43A00023	AIR-IN-CABINET (Back)	1
5	43A00024	CABINET-DOWN (Front)	1
6	43A00025	CABINET-DOWN (Back)	1
7	43A00026	SERVICE PANEL	1
8	43A00027	AIR-OUT-CABINET	1
9	43A20004	PROPELLER FAN – PY631	1
10	43A41513	COMPRESSOR – 6HP (Fixed)	1
11	43A49006	HIGH PRESSURE SWITCH	1
12	43A49007	ASM – PRESSURE – SENSOR (Low – Blue)	1
13	43A49008	ASM – PRESSURE – SENSOR (High – Red)	1
14	43A46019	ASM – SOLENOID COIL – 2-WAY (SV41 + SV42)	1
15	43A46020	ASM – SOLENOID COIL – 2-WAY (SV2 + SV3A)	1
16	43A46022	ASM – SOLENOID COIL – 2-WAY (SV3B)	1
17	43A46023	ASM – SOLENOID COIL – 2-WAY (SV3C)	1
18	43A46024	ASM – SOLENOID COIL – 4-WAY (J502 AC240V)	1
19	43A46025	COIL – PULSE MOTOR VALVE (L12A-03)	1
20	43A46026	COIL – PULSE MOTOR VALVE (A12A15)	1
21	43A46027	BODY – PULSE MOTOR VALVE (CEV30RC1)	1
22	43A46028	BODY – PULSE MOTOR VALVE (SEV18RC4)	1
23	43146499	VALVE BODY – 4-WAY (CHV-0401)	1
24	43046151	VALVE BODY – 2-WAY (NEV-603DXF)	3
25	43A46034	VALVE BODY – 2-WAY (VPV 360D)	2
26	43A48007	OIL SEPERATOR	1
27	43A48005	ACCUMULATOR (9 Litres)	1
28	43A48006	LIQUID TANK (11 Litres)	1
29	43A60013	FUSIBLE PLUG	1
30	43A43020	CONDENSER ASSEMBLY – RIGHT	1
31	43A43021	CONDENSER ASSEMBLY – LEFT	1
32	43A45003	DRYER – XH10 (R407C)	2
33	43146351	SERVICE VALVE (Gas)	1
34	43A46029	PACKED VALVE (Liquid)	1
35	43A46029	PACKED VALVE (Oil)	1
36	43A46031	CHECK VALVE (BCV – 302DY) Dia 8mm	3
37	43A46032	CHECK VALVE (BCV – 304DY) Dia 15mm	1
38	43A46035	CHECK VALVE (MP3.3MPaG) Dia 12.7mm	2
39	43A46036	CHECK JOINT (3.3MPa)	2
40	43147529	STRAINER (Dia 44mm)	1
41	43A47019	STRAINER (Dia 12.7mm)	3
42	43A47042	STRAINER (Dia 19mm)	1
43	43A57004	CRANK CASE HEATER (40W)	1
44	43A57002	ACCUMULATOR HEATER (29W)	1
45	43A51005	ISOLATOR (4 pole – 32 Amp)	1
46	43A21022	FAN MOTOR (STF – 200 – 350A)	1
47	43A42002	RUBBER COMPRESSOR MOUNTING	4
48	43A95001	RUBBER SUPPORT CUSHION (Fan Motor Assembly)	4
49	43A19011	FAN GUARD	1
50	43A46033	FLARE NUT (Oil circuit)	1
51	43A47043	CAPILLARY ASSEMBLY (1.0x2.0x1000 – Oil inlet)	1
52	43A47044	CAPILLARY ASSEMBLY (1.2x2.4x1000 – Suction)	1
53	43A47045	CAPILLARY ASSEMBLY (2.0x3.0x1000 – By-pass)	1
54	43A47046	CAPILLARY ASSEMBLY (1.2x2.4x1000 – Main oil)	2
55	43A47047	CAPILLARY ASSEMBLY (1.0x2.0x1000 – Discharge)	2
56	43A47048	CAPILLARY ASSEMBLY (1.0x2.0x1000 – By-pass)	1
57	43A16003	WIRING DIAGRAM	1

Outdoor Unit Electrical Parts Assembly

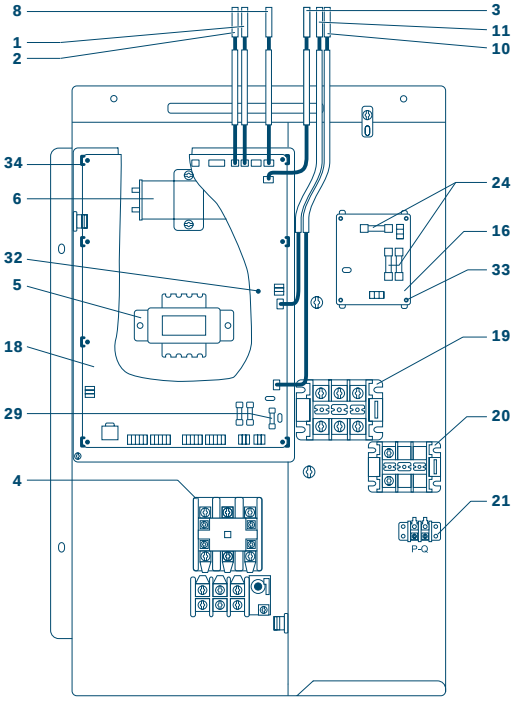
MM-A0280HT, MM-A0224HT



MM-A0280HX, MM-A0224HX



MM-A0160HX



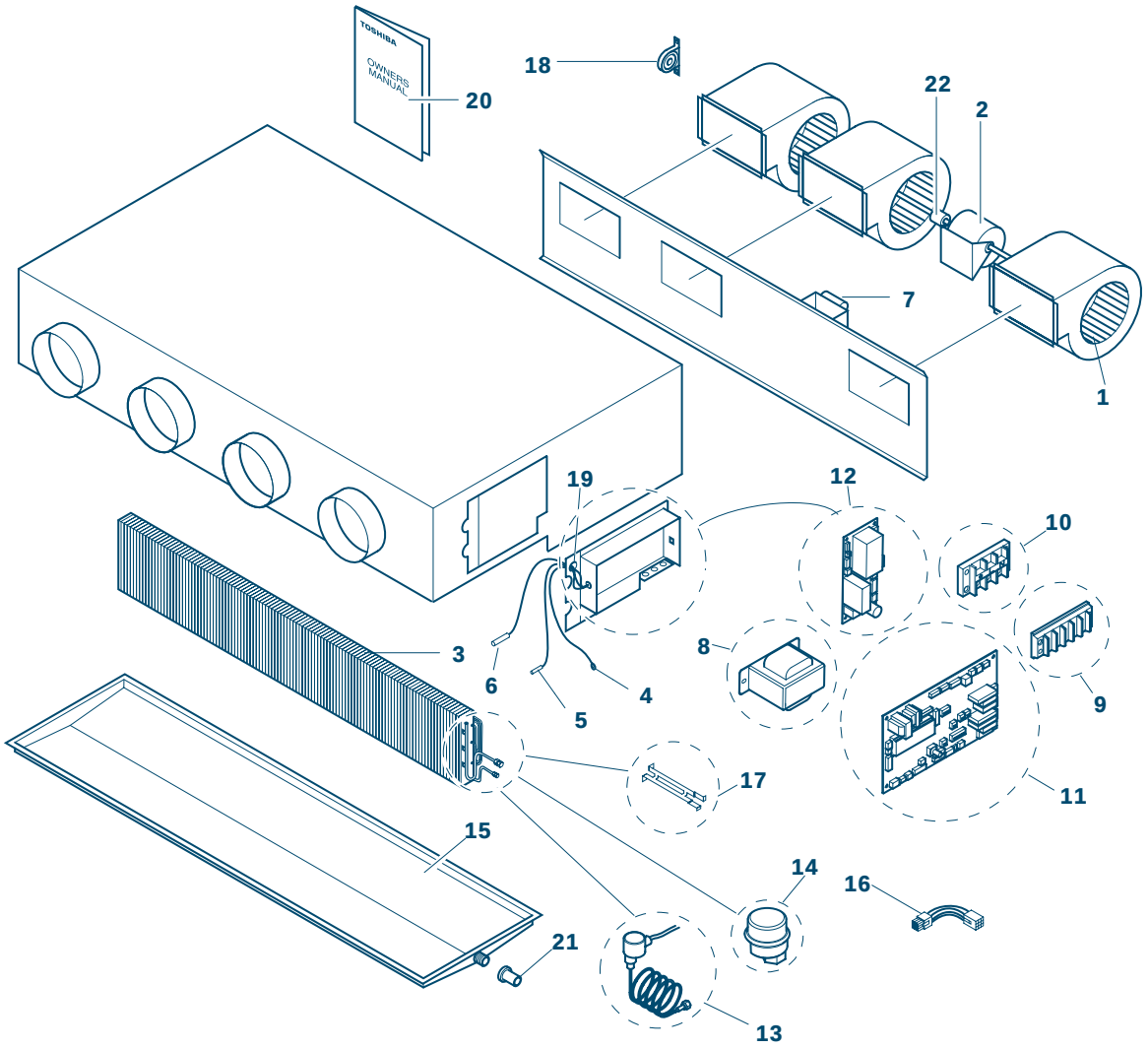
Outdoor Unit Electrical Parts Assembly

MM-A0280HT, MM-A0224HT, MM-A0280HX, MM-A0224HX, MM-A0160HX

Location No.	Part No.	Description	Model Name (MM-A)				
			0280HT	0224HT	0280HX	0224HX	0160HX
1	43A50012	TEMPERATURE SENSOR – TS1	1	1	1	1	1
2	43A50013	TEMPERATURE SENSOR – TE	1	1	1	1	1
3	43A50014	TEMPERATURE SENSOR – TK3	1	1	1	1	1
4	43A52005	MAGNETIC CONTACTOR – FC – 3	1	1	2	2	1
5	43A58006	TRANSFORMER – TT – 01	1	1	1	1	1
6	43A55004	MF – CAPACITOR – 8μF	1	1	1	1	1
7	43A55005	CAPACITOR – ELECTROLYTIC	2	2			
8	43A50015	TEMPERATURE SENSOR – TD1	1	1	1	1	1
9	43A50016	TEMPERATURE SENSOR – TD2	1	1	1	1	
10	43A50017	TEMPERATURE SENSOR – TK2	1	1	1	1	1
11	43A50018	TEMPERATURE SENSOR – TK1	1	1	1	1	1
12	43A53001	STARTER – TDK 101Y	2	2			
13	43A69016	HEATSINK – INVERTER ASSEMBLY	1	1			
14	43A69017	P.C. BOARD ASSEMBLY – MCC-1342-01 (IPDU)	1	1			
15	43A69018	P.C. BOARD ASSEMBLY – MCC-1366-01 (N / F)	1	1			
16	43A69019	P.C. BOARD ASSEMBLY – MCC-1357-01 (SURGE)			1	1	1
17	43A69020	P.C. BOARD ASSEMBLY – MCC-1343-03 (I / F)	1	1			
18	43A69021	P.C. BOARD ASSEMBLY – MCC-1343-03 (I / F)			1	1	1
19	43A60016	TERMINAL BLOCK – 3P/60A – L1, L2, L3	1	1	1	1	1
20	43A60017	TERMINAL – 3P/30A – NEUTRAL	1	1	1	1	1
21	43A60018	TERMINAL BLOCK – 2P/1A – PQ			1	1	1
22	43A60019	TERMINAL – 4P/1A – PQ XY	1	1			
23	43A55006	REACTOR – CH-25-2FK	2	2			
24	43A60020	FUSE – 6A	3	3	3	3	3
25	43A60021	FUSE – 20A	3	3			
26	43A52006	MAGNETIC CONTACTOR – FCMCa – 1S	1	1			
27	43A60022	FUSE HOLDER – 30A	3	3			
28	43A60023	FUSE – 3.15A	1	1			
29	43A60024	FUSE – 6.3A	3	3	3	3	3
30	43A63002	BUSHING	10	10			
31	43A63003	COLLAR	10	10			
32	43A63004	SUPPORT (PCB)	4	4	4	4	4
33	43A63005	SUPPORT ASSEMBLY (PCB)			1	1	1
34	43A63006	SUPPORT ASSEMBLY (PCB)	2	2	2	2	2
35	43A89001	SILICON, PACK SILICON GREASE (IPDU)	1	1			

Indoor Units

Built-In Duct – MM-B056, MM-B080, MM-B112, MM-B140

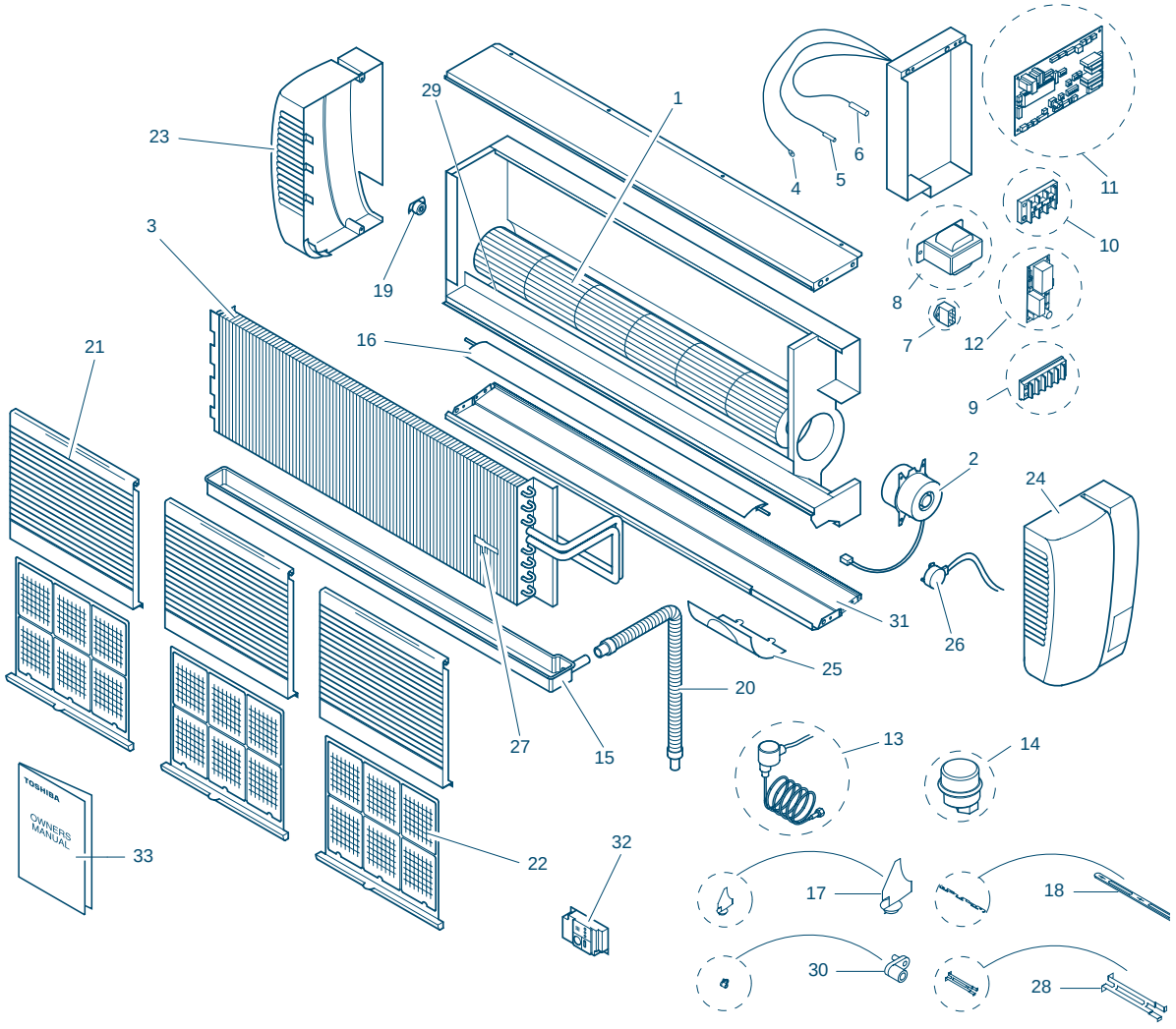


Ref No	Part No	Description	B056	B080	B112	B140
01	43120149	MULTI – FAN BLADE	1	2	2	3
02	43A21009	FAN MOTOR (60W)	1			
02	43121516	FAN MOTOR (100W)		1		
02	43121528	FAN MOTOR (120W)			1	
02	43121535	FAN MOTOR (140W)				1
03	43A44068	REFRIGERATION ASSEMBLY	1			
03	43A44069	REFRIGERATION ASSEMBLY		1		
03	43A44070	REFRIGERATION ASSEMBLY			1	
03	43A44071	REFRIGERATION ASSEMBLY				1
04	43A50024	TEMP. SENSOR – AMBIENT (TA)	1	1	1	1
05	43A50021	TEMP. SENSOR – GAS (TC1)	1	1	1	1
06	43A50022	TEMP. SENSOR – LIQUID (TC2)	1	1	1	1
07	43155080	MF CAPACITOR	1			
07	43155096	MF CAPACITOR		1	1	
07	43155097	MF CAPACITOR				1
08	43A58007	TRANSFORMER (MMS)	1	1	1	1

Ref No	Part No	Description	B056	B080	B112	B140
09	43A60025	TERMINAL 'ABC PQ E'	1	1	1	1
10	43A60012	TERMINAL 'E - L - N'	1	1	1	1
11	43A69025	PCB – CONTROL (CM**C02)	1	1	1	1
12	43A69024	PC – POWER (P**RC01)	1	1	1	1
13	43A49010	PRESSURE SENSOR (Service)	1	1	1	1
14	43A46037	PULSE MOTOR VALVE – COIL	1	1	1	1
15	43A72004	DRAIN PAN ASSEMBLY	1			
15	43A72005	DRAIN PAN ASSEMBLY		1		
15	43191310	DRAIN PAN ASSEMBLY			1	1
16	43160394	CONNECTOR, 9P	1	1	1	1
17	43A5006	TEMP. SENSOR CLIP (TC)	2	2	2	2
18	43125135	BEARING				1
19	43A60009	BUSHING Ø 38 mm	1	1	1	1
20	43A88013	OWNERS MANUAL	1	1	1	1
21	43A70002	DRAIN SOCKET	1	1	1	1
22	43125137	COUPLING				1

Indoor Units

High Wall – MM-K042, MM-KR042, MM-K056, MM-KR056, MM-K080, MM-KR080

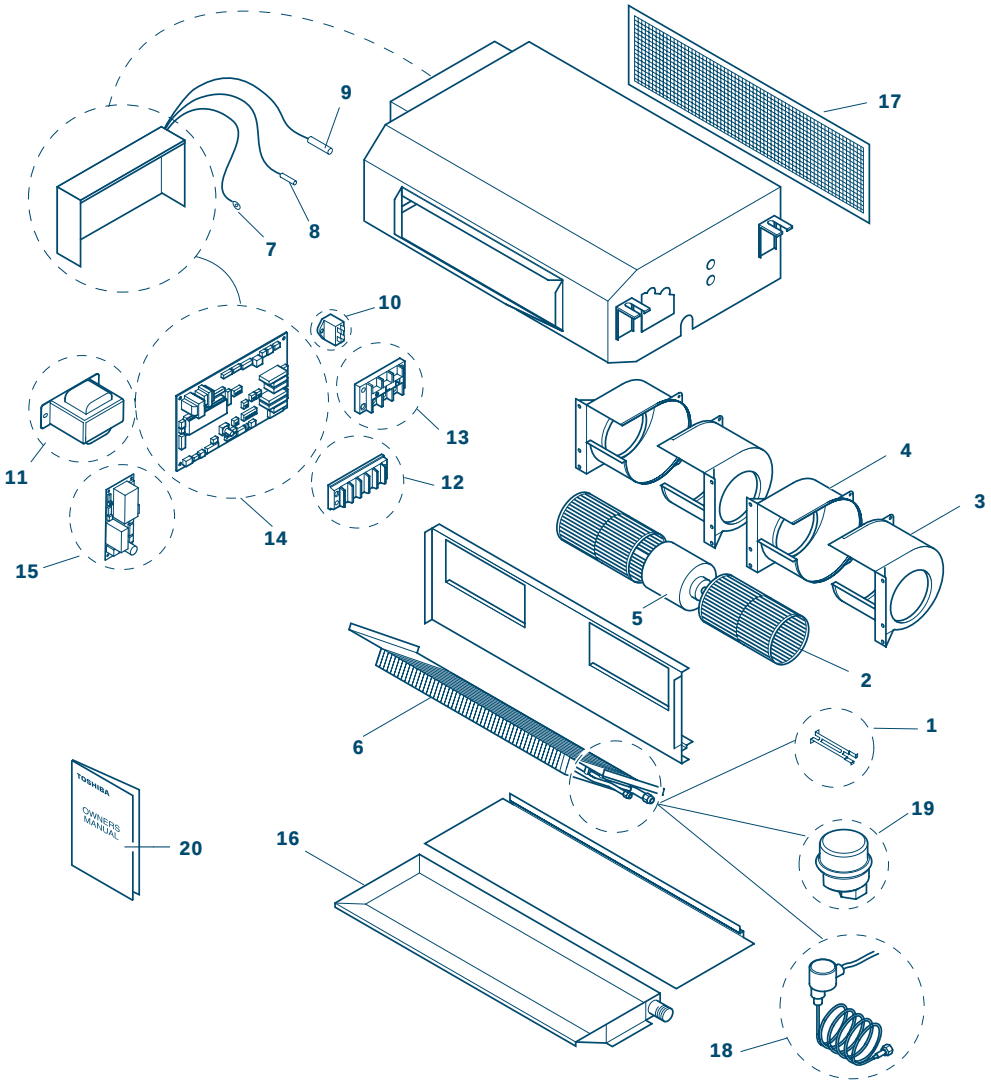


Ref No	Part No	Description	K042	KR042	K056	KR056	K080	KR080
01	43120135	CROSS FLOW FAN	1	1	1	1		
01	43120136	CROSS FLOW FAN					1	1
02	43A21016	FAN MOTOR (27W)	1	1	1	1		
02	43A21017	FAN MOTOR (27W)					1	1
03	43A44072	REFRIGERATION ASSEMBLY	1	1				
03	43A44073	REFRIGERATION ASSEMBLY			1	1		
03	43A44074	REFRIGERATION ASSEMBLY					1	1
04	43A50027	TEMP. SENSOR – AMBIENT (TA)	1	1	1	1	1	1
05	43A50021	TEMP. SENSOR – GAS (TC1)	1	1	1	1	1	1
06	43A50022	TEMP. SENSOR – LIQUID (TC2)	1	1	1	1	1	1
07	43155100	MF CAPACITOR	1	1				
07	45155101	MF CAPACITOR			1	1		
07	43A55002	MF CAPACITOR					1	1
08	43A58007	TRANSFORMER (MMS)	1	1	1	1	1	1
09	43A60025	TERMINAL 'ABC PQ E'	1	1	1	1	1	1
10	43A60012	TERMINAL 'E-L-N'	1	1	1	1	1	1
11	43A69028	PCB – CONTROL (CM**C03)	1	1	1	1	1	1
12	43A69024	PCB – POWER (P**RC01)	1	1	1	1	1	1
13	43A49010	PRESSURE SENSOR (SERVICE)	1	1	1	1	1	1
14	43A46037	PULSE MOTOR VALVE – COIL	1	1	1	1	1	1
15	43172114	DRAIN PAN	1	1	1	1		
15	43172112	DRAIN PAN					1	1

Ref No	Part No	Description	K042	KR042	K056	KR056	K080	KR080
16	43A09005	H-GRILLE	1	1	1	1		
16	43A09006	H-GRILLE					1	1
17	43A09003	V-GRILLE	15	15	15	15	21	21
18	43A39004	CONNECTION BAR	5	5	5	5	7	7
19	43022189	BEARING	1	1	1	1	1	1
20	43170182	DRAIN HOSE	1	1	1	1	1	1
21	43A09004	INLET GRILLE	3	3	3	3	4	4
22	43A80008	AIR FILTER	3	3	3	3	4	4
23	43A00001	SIDE CABINET – LEFT	1	1	1	1	1	1
24	43A00002	SIDE CABINET RIGHT	1	1	1	1	1	1
25	43A00003	CONTROL PANEL	1		1		1	
25	43A01005	CONTROL PANEL – REMOTE		1		1		1
26	43121533	GEARED MOTOR	1	1	1	1	1	1
27	43A19002	SENSOR HOLDER	1	1	1	1	1	1
28	43A50006	TEMP. SNESOR CLIP (TC)	2	2	2	2	2	2
29	43122028	FAN NOSE	1	1	1	1		
29	43122029	FAN NOSE					1	1
30	43119394	LEVER	1	1	1	1	1	1
31	43A91054	D CABI – ASSEMBLY	1	1	1	1		
31	43A91055	D CABI ASSEMBLY					1	1
32	43A69012	INFRA RED RECEIVER		1		1		1
33	43A88011	OWNER'S MANUAL	1	1	1	1	1	1

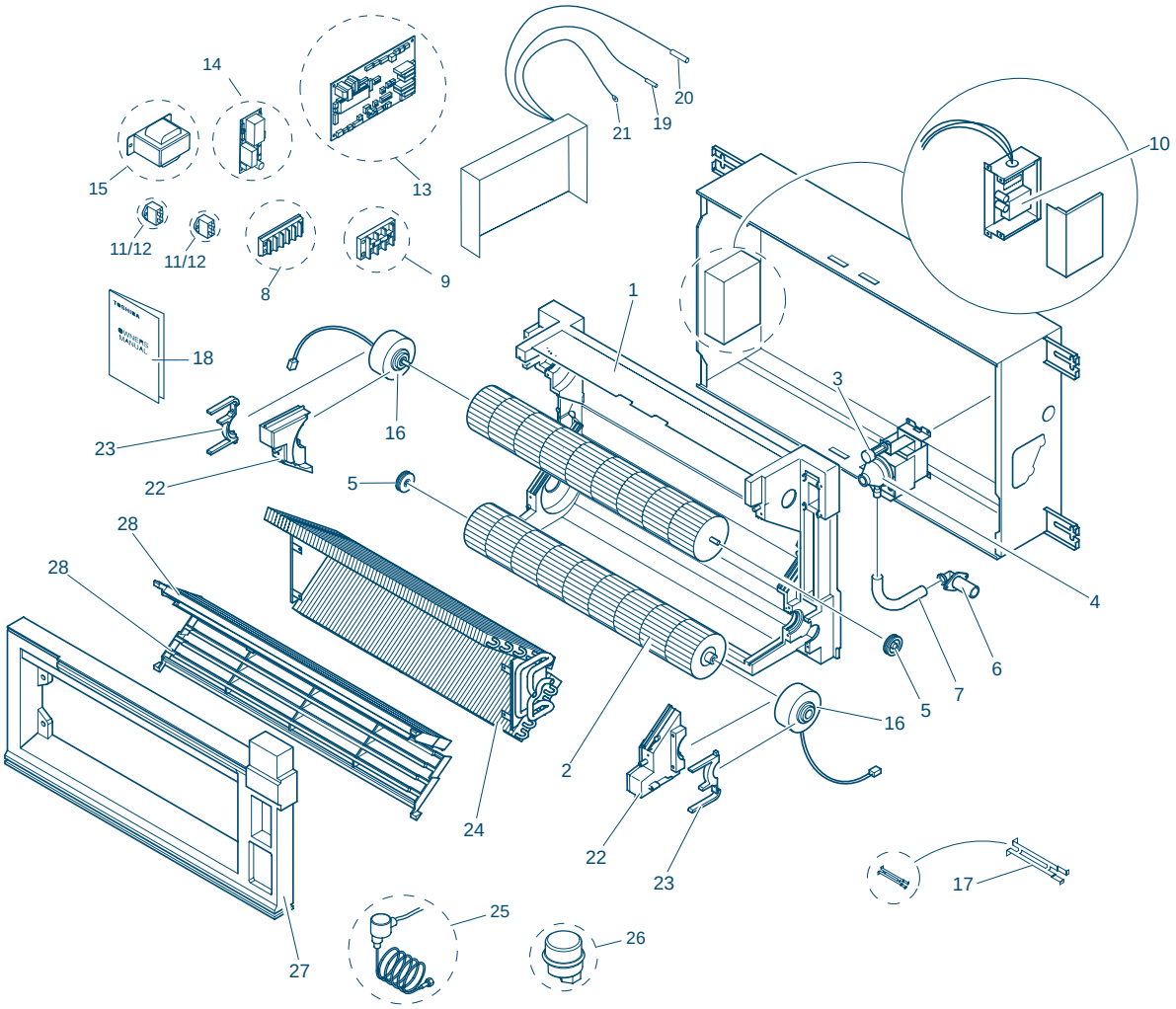
Indoor Units

Built-In Slim Duct – MM-SB028



Ref No	Part No	Description	SB082
01	43A50006	TEMPERATURE SENSOR CLIP (TC)	2
02	43A20003	FAN MULTI-BLADE	2
03	43A22005	S FAN CASE	2
04	43A22006	S FAN CASE	2
05	43A21020	FAN MOTOR (34W)	1
06	43A44063	REFRIGERATION ASSEMBLY	1
07	43A50023	TEMPERATURE SENSOR – AMBIENT (TA)	1
08	43A50019	TEMPERATURE SENSOR – GAS (TC1)	1
09	43A50020	TEMPERATURE SENSOR – LIQUID (TC2)	1
10	43155100	MF CAPACITOR	1
11	43A58004	TRANSFORMER (MMS)	1
12	43A60010	TERMINAL 'ABC PQ'	1
13	43A60012	TERMINAL 'E - L - N'	1
14	43A69025	PC BOARD – CONTROL (MMS)	1
15	43A69024	PC BOARD – POWER (MMS)	1
16	43A72011	DRAIN PAN	1
17	43A80009	FILTER	1
18	43A49010	PRESSURE SENSOR (SERVICE)	1
19	43A46037	PULSE MOTOR VALVE – COIL	1
20	43A88013	OWNER'S MANUAL	1

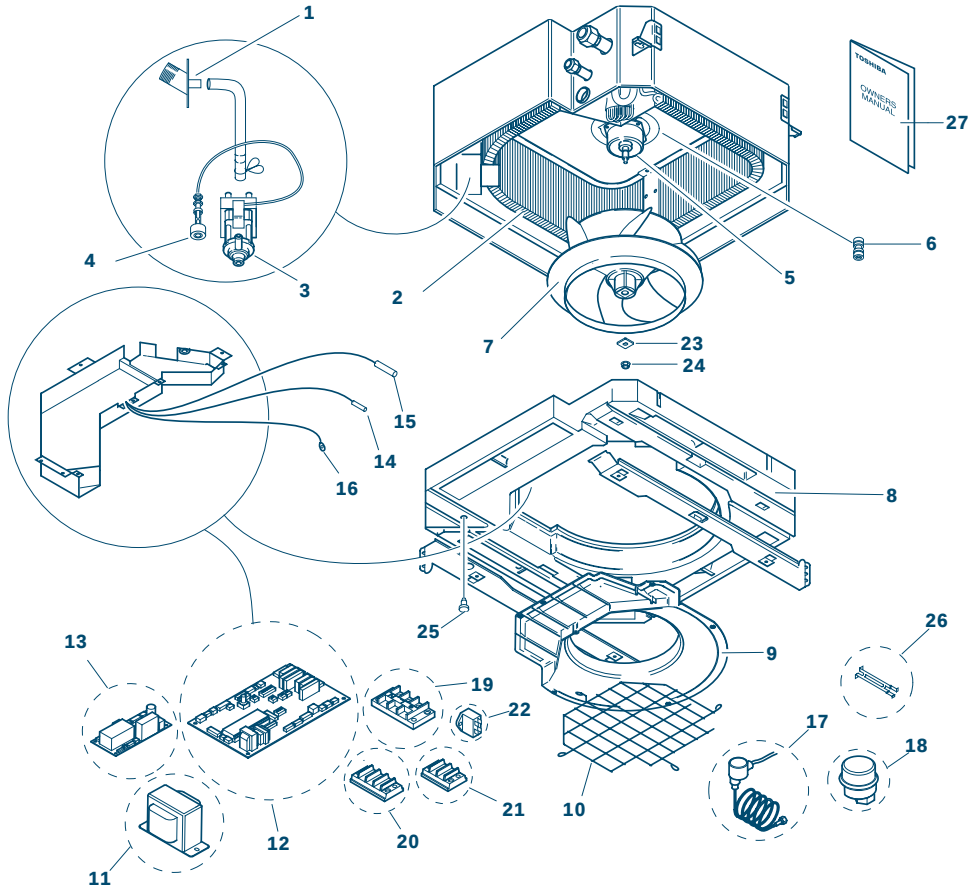
2-Way Cassette – MM-TU028, MM-TU042, MM-TU056



Ref No	Part No	Description	TU028	TU042	TU056
01	43A22007	BLOWER BASE ASSEMBLY	1	1	1
02	43020288	CROSS FLOW FAN	2	2	2
03	43A51002	FLOAT SWITCH	1	1	1
04	43A70008	PUMP ASSEMBLY	1	1	1
05	43020253	BEARING	2	2	2
06	43071019	DRAIN CONNECTION	1	1	1
07	43A70009	DRAIN HOSE	1	1	1
08	43A60025	TERMINAL 'ABC PQ E'	1	1	1
09	43A60012	TERMINAL 'E-L-N'	1	1	1
10	43A69008	INTERFACE PC BOARD	1	1	1
11	37555721	MF CAPACITOR	2		
12	43155100	MF CAPACITOR		2	2
13	43A69023	PCB – CONTROL (CM**C01)	1	1	1
14	43A69024	PCB – POWER (P**RC01)	1	1	1
15	43A58007	TRANSFORMER (MMS)	1	1	1

Ref No	Part No	Description	TU028	TU042	TU056
16	43A21014	FAN MOTOR (PAF - 230 - 7 - 4)	2	2	2
17	43A50006	TEMPERATURE SENSOR CLIP (TA)	2	2	2
18	43A88013	OWNER'S MANUAL	1	1	1
19	43A50019	TEMP. SENSOR – GAS (TC1)	1	1	1
20	43A50020	TEMP. SENSOR – LIQUID (TC2)	1	1	1
21	43A50027	TEMP. SENSOR – AMBIENT (TA)	1	1	1
22	43A22008	MOTOR BAND – LEFT	2	2	2
23	43A22009	MOTOR BAND – RIGHT	2	2	2
24	43A44082	REFRIGERATION ASSEMBLY	1		
24	43A44083	REFRIGERATION ASSEMBLY		1	
24	43A44084	REFRIGERATION ASSEMBLY			1
25	43A49010	PRESSURE SENSOR (SERVICE)	1	1	1
26	43A46037	PULSE MOTOR VALVE – COIL	1	1	1
27	43A72010	DRAIN PAN	1	1	1
28	43A83001	DRAIN GUIDE ASSEMBLY	1	1	1

4-Way Cassette – MM-U056, MM-U080

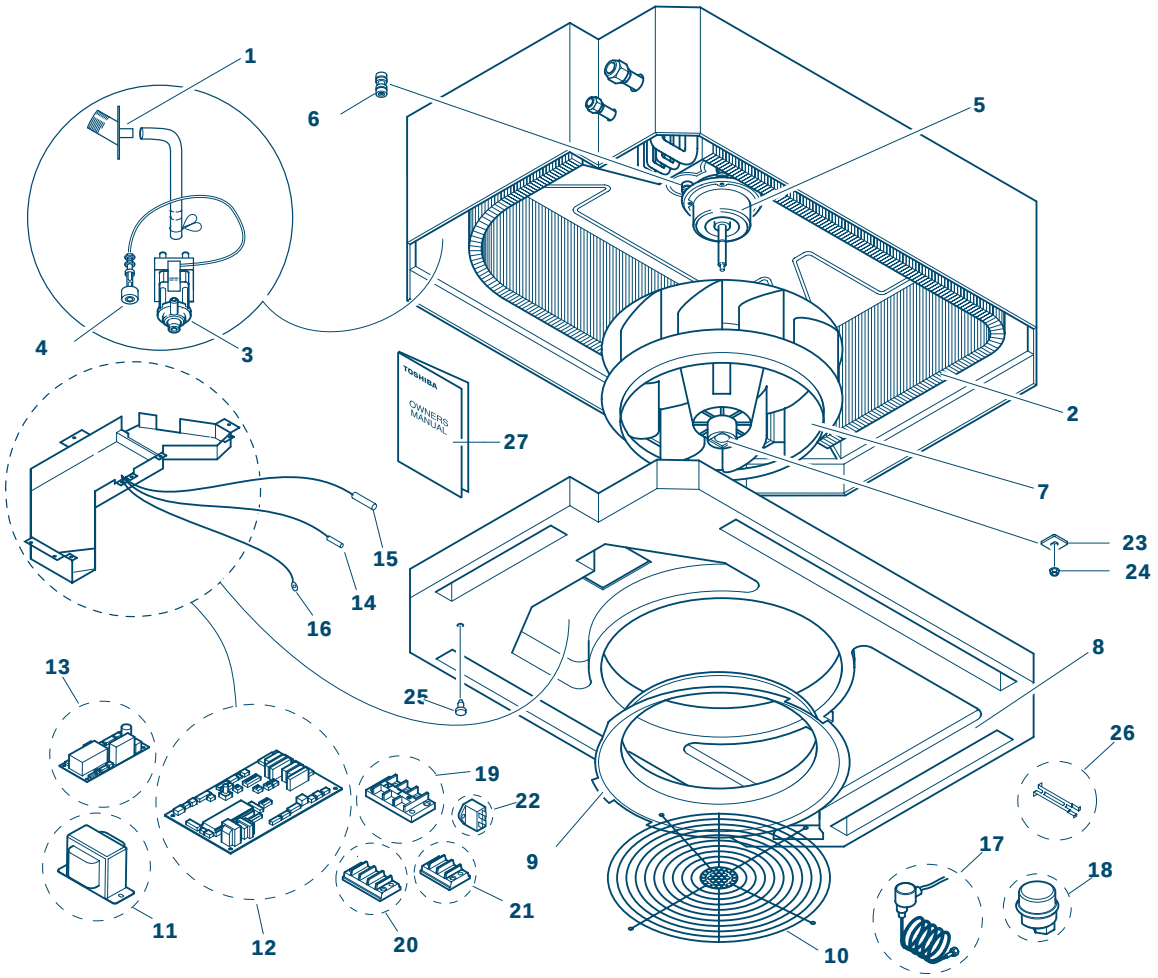


Ref No	Part No	Description	U056	U080
01	43A70005	DRAIN HOSE ASSEMBLY	1	1
02	43A44066	REFRIGERATION ASSEMBLY		1
02	43A44067	REFRIGERATION ASSEMBLY	1	
03	43A70006	DRAIN PUMP	1	1
04	43A51002	FLOAT SWITCH	1	1
05	43A21018	FAN MOTOR (28W)	1	1
06	43A11004	RUBBER INSULATION	3	3
07	43A20001	CENTRIFUGAL FAN	1	1
08	43A72006	DRAIN PAN ASSEMBLY	1	1
09	43A22003	BELLMOUTH	1	1
10	43A19004	FAN GUARD	1	1
11	43A58007	TRANSFORMER (MMS)	1	1
12	43A69023	PCB – CONTROL (CM**C01)	1	1
13	43A69024	PCB – POWER (P**RC01)	1	1
14	43A50021	TEMP. SENSOR – GAS (TC1)	1	1

Ref No	Part No	Description	U056	U080
15	43A50022	TEMP. SENSOR – LIQUID (TC2)	1	1
16	43A50023	TEMP. SENSOR – AMBIENT (TA)		1
17	43A49010	PRESSURE SENSOR (SERVICE)	1	
18	43A46037	PULSE MOTOR VALVE – COIL	1	1
19	43A60012	TERMINAL 'E - L - N'	1	1
20	43A60002	TERMINAL 'ABC'	1	1
21	43A60011	TERMINAL 'P,Q'	1	1
22	43A55002	MF CAPACITOR		1
22	43155100	MF CAPACITOR	1	
23	43097166	WASHER	1	1
24	43A97002	FAN WASHER	1	1
25	43A72008	PLUG	1	1
26	43A50006	TEMP. SENSOR CLIP (TC)	2	2
27	43A88013	OWNER'S MANUAL	1	1

Indoor Units

4-Way Cassette – MM-U112, MM-U140



Ref No	Part No	Description	U112	U140
01	43A70005	DRAIN HOSE ASSEMBLY	1	1
02	43A44064	REFRIGERATION ASSEMBLY	1	
02	43A44065	REFRIGERATION ASSEMBLY		1
03	43A70006	DRAIN PUMP	1	1
04	43A51002	FLOAT SWITCH	1	1
05	43A21019	FAN MOTOR (36W)	1	1
06	43A11005	RUBBER INSULATION	4	4
07	43A20002	CENTRIFUGAL FAN	1	1
08	43A72007	DRAIN PAN ASSEMBLY	1	1
09	43A22004	BELLMOUTH	1	1
10	43A19005	FAN GUARD	1	1
11	43A58007	TRANSFORMER (MMS)	1	1
12	43A69023	PCB – CONTROL (CM**C01)	1	1
13	43A69024	PCB – POWER (P**RC01)	1	1
14	43A50021	TEMP. SENSOR – GAS (TC1)	1	1

Ref No	Part No	Description	U112	U140
15	43A50022	TEMP. SENSOR – LIQUID (TC2)	1	1
16	43A50023	TEMP. SENSOR – AMBIENT (TA)	1	1
17	43A49010	PRESSURE SENSOR (SERVICE)	1	1
18	43A46037	PULSE MOTOR VALVE - COIL	1	1
19	43A60012	TERMINAL 'E - L - N'	1	1
20	43A60002	TERMINAL 'ABC'	1	1
21	43A60011	TERMINAL 'P,Q'	1	1
22	43155138	MF CAPACITOR	1	
22	43155120	MF CAPACITOR		1
23	43097166	WASHER	1	1
24	43A97002	FAN WASHER	1	1
25	43A72008	PLUG	1	1
26	43A50006	TEMP. SENSOR CLIP (TC)	2	2
27	43A88013	OWNER'S MANUAL	1	1

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